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Ex Tuto
Publishing
www.extuto.com

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Internationalisation of Law in the Digital Information Society: Nordic Yearbook of Law and Informatics 2010–2012
First edition, first impression

Published by:
Ex Tuto Publishing A/S
Toldbodgade 55
1253 Copenhagen, Denmark
www.extuto.com

ISBN 978-87-92598-22-6

Printed in Denmark by Narayana Press, Gylling
Typeset and layout: MERE.INFO A/S, Copenhagen, Denmark

Photo: www.travelphotography.dk.

12. Law Is Not or Must Not Be Just Verbal and Visual in the 21st Century: Toward Multisensory Law

Dr. Colette R. Brunschwig*

Humans are multisensory beings and live in a multisensory world. Human communication involves the production and perception of messages, as well as the five senses (hearing, vision, touch, taste, and smell). Multimodal or multisensory systems are capable of receiving and sending information by using various sensory channels involving vision, hearing, and movement, but preferably all five senses. Such computer systems are used not only in human communication but also in machine communication. These systems have brought forth a trend toward multisensory digital communication practices in the 21st century. Such multisensory digital media help us produce meaning by using two or more discrete sign systems (i.e., audio-visual, visual-kinaesthetic, tactile-kinaesthetic, and so forth). The advent of digital media and their implications for the law has prompted some scholars to suggest that a visual turn is also occurring in the legal context. Whereas this may be partly true, by restricting or confining the law to the verbal and visual, legal discourse has difficulties in becoming sufficiently aware of multisensory digital media and thus fails to adequately explore these media and their impact on the law—in overt contradiction to the growing significance of such media. Overemphasising both verbal and visual legal communication leads to marginalising or even to ignoring other modalities of already existing or future digital legal communication. Given these problems, this paper seeks to develop tentative answers to five key questions: 1. What is multisensory law? 2. What are the impacts of multisensory digital media on the law? 3. How could or rather should greater awareness be raised in legal discourse about the current and future relevance of multisensory digital media for the law? 4. How could or rather should the marginalising and ignoring of multisensory digital legal com-

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munication practices be challenged? 5. How are these research questions relevant to legal discourse, particularly legal history, legal informatics, legal pedagogy, legal psychology, and legal theory? In addressing these questions, this paper draws on insights from different legal and non-legal disciplines, such as the anthropology of the senses, communication studies, legal history, legal informatics, legal psychology (therapeutic jurisprudence), legal theory, multisensory law, perceptual psychology, and so forth.

12.1. Introduction

12.1.1. Background

12.1.1.1. Humans as multisensory beings in a multisensory world

The title of this section is inspired by PAGLIANO, the author of *The Multisensory Handbook*, who observes that 'Our senses connect our brains to the concrete world (including our bodies) and they are essential for our survival. There is still much debate as to exactly how many different senses we have, whether the number is five, sixteen or even higher, and their relative importance to each other. Needless to say, *we are multisensory beings* and *we live in a multisensory world* [my emphases].'[1]

It is beyond the scope of this paper to either debate or determine the number of human senses. Crucially, our surroundings address more than just one of our senses at a time.

12.1.1.2. Multimodal or multisensory systems (interfaces)

Currently, we are witnessing the emergence of multimodal or multisensory systems (interfaces). OVIATT describes such systems as follows:

'Multimodal systems process two or more combined user input modes —such as speech, pen, touch, manual gestures, gaze, and head, and body movements—in a coordinated manner with multimedia output. This class of systems represents a new direction for computing, and a paradigm shift

1 Paul Pagliano, *The Multisensory Handbook: A Guide for Children and Adults with Sensory Learning Disabilities* (London, New York, NY: Routledge, 2012), 3.

away from conventional Windows, Icons, Menus, and Pointer interfaces.'[2] This new category of interfaces, she continues, 'aims to recognize naturally occurring forms of human language and behaviour, which incorporate at least one recognition-based technology (e.g., speech, pen, vision).'[3]

She concludes with the following prediction, which I quote in full:

> 'The advent of multimodal interfaces based on recognition of human speech, gaze, gesture, and other natural behavior represents only the beginning of a progression toward computational interfaces capable of relatively *human-like sensory perception*. Such interfaces eventually will interpret continuous input from a large number of different visual, auditory, and tactile input modes, which will be recognized as users engage in everyday activities. The same system will track and incorporate information from *multiple sensors* on the user's interface and surrounding physical environment in order to support intelligent adaption to the user, task, and usage environment. Future adaptive *multimodal-multisensor interfaces* have the potential to support new functionality, to achieve unparalleled robustness, and to perform flexibility as a multifunctional and personalized mobile system [my emphases].'[4]

One could consider the emerging multisensory brain-computer interfaces (BCIs) as examples or rather applications of multimodal or multisensory systems. According to WAGNER, DALY, & VÄLJAMÄE, '[i]n the last two decades multisensory research has clearly demonstrated that human perception and cognition is largely multisensory … which may have important implications for future BCI systems development. The shift from the traditional unisensory view on brain sensory processing towards a multisensory one can have a strong impact on a number of different applications.'[5]

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2 Sharon Oviatt, 'Multimodal Interfaces', *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications*, 3rd ed., ed. Julie A. Jacko (Boca Raton, London, New York, NY: CRC Press, 2012), 405, 405-429.

3 Ibid.

4 Oviatt, 'Multimodal Interfaces', 495. On multimodal interfaces, see also Borko Furht, 'Multimodal Interfaces', *Encyclopedia of Multimedia A-Z*, 2nd ed. Borko Furht (New York, NY: Springer, 2008), 650-651.

5 Isabella C. Wagner, Ian Daly, & Aleksander Väljamäe, 'Non-visual and Multisensory BCI Systems: Present and Future.' *Towards Practical Brain-Computer Interfaces:*

12.1.1.3. Multisensory digital rhetoric

Multimodal or multisensory systems impact digital rhetoric. That is, digital rhetoric shifts from a unisensory mode (i.e., visual, auditory, tactile, and so forth) to a multisensory one (i.e., audio-visual, tactile-kinaesthetic, visual-kinaesthetic, and so forth). Or, as HOCK states, 'The screen itself is a tablet that combines words, interfaces, icons, and pictures that invoke other modalities like touch and sound. But because modern information technologies construct meaning as simultaneously verbal, visual and interactive hybrids, digital rhetoric *simply assumes* the use of visual rhetoric *as well as other modalities* [my emphases].'[6]

Even SHERWIN, a US-American advocate of *visual jurisprudence*,[7] that is, of both *unisensory* and *ocularocentric* jurisprudence, discusses '*multi-modal* [my emphasis] communication technologies'[8] and how 'they affect the content and meaning of law'.[9] Moreover, he uses 'multimodal' (i.e., multisensory) as follows: 'Through a close study of the discourse used by legal (and non-legal) actors in a variety of legal settings, including visual and *multi-modal* [my emphasis] digital forms of discourse, we find not only strategic clues how a particular judge or advocate may nestle his or her theory of the case within a familiar story genre …'[10] Despite SHERWIN's broad sensory view on legal persuasion in different legal contexts, he actually refers only to what he—in sensorial terms—calls '*visual* persuasion [my emphasis]', that is, persuasion limited to addressing only one human sense.[11]

Bridging the Gap from Research to Real-World Applications, eds. Brendan Z. Allison et al. (Heidelberg et al.: Springer, 2012), 375, 375-393.

6 Mary E. Hocks, 'Understanding Visual Rhetoric in Digital Writing Environments.' *College Composition and Communication*, Vol. 54, No. 4 (2003), 631, 629-656.

7 Richard K. Sherwin, *Visualizing Law in the Age of the Digital Baroque: Arabesques and Entanglements* (London, New York, NY: Routledge, 2011), 13-55, and id., 'Constitutional Purgatory: Shades and Presences Inside the Courtroom.' *Visualizing Law and Authority: Essays on Legal Aesthetics*, ed. Leif Dahlberg (Berlin, Boston, MA: De Gruyter, 2012), 270, 288, 289, and 290, 266-291.

8 Id., 'A Manifesto for Visual Legal Realism.' *Loyola of Los Angeles Law Review*, Vol. 40, Issue 3 (2007), 719, 719-744.

9 Id., 'A Manifesto for Visual Legal Realism,' 719-720.

10 Id., 'A Manifesto for Visual Legal Realism,' 720-721. See also id., 'A Manifesto for Visual Legal Realism,' 738.

12.1.2. Problems

12.1.2.1. Law as text: verbocentrism in the legal context

KATSH calls the law 'a text-oriented universe'.[12] It is no surprise to him 'that machines with powerful capabilities for processing text would find the law to be a lucrative market.'[13] In *Law on Display*, FEIGENSON & SPIESEL note that 'Law has traditionally been about words: trial testimony and oral argument, statutes and judicial opinions, negotiations and jury deliberations.'[14] Elsewhere, they observe that 'Law, like most other disciplines or practices that aspire to rationality, has tended to identify that rationality (and hence its virtue) with texts rather than pictures, with reading words rather than 'reading' pictures, to the point that it is often thought that thinking in words is the only kind of thinking there is.'[15]

RÜTHERS, FISCHER, & BIRK, three German-speaking legal theorists, claim that '[n]o law exists outside language [my translation]'.[16] Thus, traditional legal literacy involves reading and writing legal and legally relevant texts, and of course verbal rhetoric (for instance, in court proceedings). In the legal context, the verbocentric paradigm remains dominant to this day. This paradigm 'implies that legal actors, whether they are legal scholars or practitioners, equate the law with written or spoken language.'[17]

11 See the Visual Persuasion Project website at: http://www.nyls.edu/centers/projects/visual_persuasion (last accessed on 4 February 2013).

12 M. Ethan Katsh, *Law in a Digital World* (New York, NY, Oxford: Oxford University Press, 1995), 146. Similarly, see Peter Wahlgren, *'Visualization of the Law,' Legal Stagings: The Visualization, Medialization and Ritualization of Law in Language, Literature, Media, Art and Architecture*, eds. Kjell Å Modéer & Martin Sunnquist (Copenhagen: Museum Tusculanum Press, 2012), 19, 19-24.

13 Katsh, *Law in a Digital World*, 146.

14 Neal Feigenson & Christina Spiesel, *Law on Display: The Digital Transformation of Legal Persuasion and Judgment* (New York, NY, London: New York University Press, 2009), xi.

15 Id., *Law on Display*, 4.

16 Bernd Rüthers, Christian Fischer, & Axel Birk, *Rechtstheorie mit Juristischer Methodenlehre* (Munich: Verlag C. H. Beck, 2011), 99 n. 150.

17 Colette R. Brunschwig, 'Multisensory Law and Therapeutic Jurisprudence: How Family Mediators Can Better Communicate with Their Clients,' *Phoenix Law Review*, Vol. 5, No. 4 (2012), 744, 705-746.

12.1.2.2. Law as image: ocularocentrism in the legal context

Given the advent of visual digital media and its implications for the law, some legal scholars, however, suggest that a *visual turn* is also occurring in the legal context.[18] SHERWIN perceives a 'cultural shift from the rule of the written or spoken word to that of the visual or digital image.' This shift, he argues, 'compels us to view the pursuit of truth and justice in our time from a radically different perspective than the one we inherited from the European Enlightenment.'[19] Elsewhere, SHERWIN notes 'that law has migrated to the screen, both in court and out',[20] and that '[l]aw, too, is going visual'.[21] He further observes 'the visual life of law',[22] that law 'is lived cinematically',[23] that 'law lives like an image',[24] and that 'law lives the life of images on the screen'.[25] FEIGENSON & SPIESEL also mention that the law 'has gone visual'.[26]

Similarly, BOEHME-NESSLER, a German legal scholar, contemplates the growing importance of images in the modern world. Images, he claims, 'are in the process of taking over from books as the main cultural medium'. Crucially, for our purposes here, 'the law cannot exempt itself from this development. In recent times the signs are growing ever stronger that the importance of images *in* the law is gradually increasing.'[27]

Such ocularocentric views may be partly true, considering the many visual legal phenomena currently emerging: legal norm images,[28] legal visu-

18 Sherwin, *Visualizing Law in the Age of the Digital Baroque*, 11. See also Feigenson & Spiesel, *Law on Display*, 13-17.

19 Sherwin, 'Imagining Law as Film (Representation without Reference?)' *Law and the Humanities: An Introduction*, eds. Austin Sarat, Matthew Anderson, & Catherine O. Frank (Cambridge et al.: Cambridge University Press, 2010), 246, 241-268.

20 Id., 'A Manifesto for Visual Legal Realism,' 720.

21 Id., 'A Manifesto for Visual Legal Realism,' 727.

22 Id., *Visualizing Law in the Age of the Digital Baroque*, 5.

23 Id., 'Imagining Law as a Film,' 245.

24 Id., *Visualizing Law in the Age of the Digital Baroque*, 49.

25 Sherwin, 'Constitutional Purgatory,' 280.

26 Feigenson & Spiesel, *Law on Display*, 10.

27 Volker Boehme-Nessler, *Pictorial Law: Modern Law and the Power of Pictures* (Berlin, Heidelberg: Springer, 2011), 115. See also id., *Pictorial Law*, 116-117.

28 See Colette R. Brunschwig, *Visualisierung von Rechtsnormen*: *Legal Design* (Zurich: Schulthess Juristische Medien, 2001).

alisations in court judgments,[29] legal visualisations for educational purposes,[30] legal visualisations in private legal practice (e.g., contract visualizations),[31] visual evidence,[32] and so forth.

12.1.2.3. Difficulties, a contradiction, and a research gap

Restricting or confining the law to the verbal and visual makes it difficult for legal discourse to adequately explore multisensory digital media and their impact on the law. Commenting on the relevant implications, FEIGENSON & SPIESEL argue that this shortcoming 'poses a major obstacle to understanding what is happening as digitization transforms our world ...'[33] That world, as we are aware, is being shaped increasingly by multimodal or multisensory digital media. As MEYERSON, chief innovation officer at IBM, puts it: 'A host of technologies are coming that will help us overcome our limitations and will transform the way we interact

29 See id., 'Legal Visualizations in Court Judgments: Reflections and Questions,' available at: http://community.beck.de/gruppen/forum/visual-law/legal-visualizations-in-court-judgments-reflections-and-questions (last accessed on 4 February 2013).

30 See Raphaela Henze, *Bildmedien im juristischen Unterricht* (Berlin: Tenea Verlag, 2003); Eric Hilgendorf, *dtv-Atlas Recht, Vol. 1: Grundlagen, Staatsrecht, Strafrecht* (Munich: Deutscher Taschenbuch Verlag, 2003); Thomas Langer, *Die Verbildlichung der juristischen Ausbildungsliteratur* (Berlin: Tenea Verlag, 2004); Felix Herzog, *Strafrecht illustrated: 30 Fälle aus dem Strafrecht in Wort und Bild* (Hamburg: merus verlag, 2007); Erich Hilgendorf, *dtv-Atlas Recht, Vol. : Verwaltungsrecht, Zivilrecht* (Munich: Deutscher Taschenbuch Verlag, 2007); Klaus F. Röhl & Stefan Ulbrich, *Recht anschaulich: Visualisierung in der Juristenausbildung* (Cologne: Halem, 2007), and Bernhard Bergmans, *Visualisierungen in Rechtslehre und Rechtswissenschaft: Ein Beitrag zur Rechtsvisualisierung* (Berlin: Logos Verlag, 2009).

31 See, for instance, Helena Haapio et al., 'Time for a Visual Turn in Contracting?' *Journal of Contract Management*, Summer (2012), 49-57 (with further references).

32 See, for instance, Sam Gregory et al. (eds.), *Video for Change: A Guide for Advocacy and Activism* (London, Ann Arbor, MI: Pluto Press, 2005); Feigenson & Spiesel, *Law on Display*; Gregory P. Joseph, *Modern Visual Evidence* (New York, NY: Law Journal Press, 2011); Sherwin, *Visualizing Law in the Age of the Digital Baroque*; and Daniela Carpi, 'Crime Evidence: "Simulacres et Simulations", Photography as Forensic Evidence,' *Visualizing Law and Authority: Essays on Legal Aesthetics*, ed. Leif Dahlberg (Berlin, Boston, MA: De Gruyter, 2012), 253-265.

33 Feigenson & Spiesel, *Law on Display*, 4. Feigenson & Spiesel refer to the transformation of the world 'into one dominated by pictures'. Given the poignance of their phrase, I take the liberty of relating it to all sensory digital media.

with machines and with each other.'[34] Further, 'one of the most intriguing aspects of this shift is our ability to give machines some of the capabilities of the right side of the human brain. New technologies make it possible for machines to mimic and augment the senses. Today, we see the beginnings of sensing machines in self-parking cars and biometric security—and the future is wide open.'[35] In short, these difficulties strongly contradict the growing significance of multimodal or multisensory digital media. Over-emphasizing verbal and visual legal communication leads to marginalising or even to ignoring other modalities of existing or future multisensory digital legal communication.

12.1.3. Questions

The subtitle of my paper—'Toward Multisensory Law'—introduces a relatively new term, which first needs to be clarified. The problems discussed above lead to further questions:

1. What are the impacts of multisensory digital media on the law?
   a. Is there already a trend toward the law as a multisensory phenomenon, that is, toward multisensory digital legal communication practices? If so, what does this trend look like? If not yet, what might such a trend look like?
   b. How are multisensory digital media further relevant to the law? Or how might they be further legally relevant? That is, do they or might such media have a further bearing on the law?
2. How could or rather should greater awareness be raised in legal discourse about the current and future relevance of multisensory digital media for the law?
3. How could or rather should the marginalising and ignoring of multisensory digital legal communication practices be challenged?

34 Bernard Meyerson, 'The IBM Next 5 in 5: Our 2012 Forecast of Inventions that Will Change the World Within Five Years,' Building a Smarter Planet: A Smarter Planet Blog, 17 December 2012, available at: http://asmarterplanet.com/blog/2012/12/the-ibm-5-in-5-our-2012-forecast-of-inventions-that-will-change-the-world-within-five-years.html (last accessed on 4 February 2013).

35 Meyerson, 'The IBM Next 5 in 5,' [s.p].

4. How are these research questions relevant to legal discourse, particularly legal history, legal informatics, legal pedagogy, legal psychology, and legal theory?

12.2. Multisensory law: a rough outline

What follows is a rough outline of multisensory law, which I have explained in detail elsewhere.[36]

12.2.1. Multisensory law: the term

'Understanding the term *multisensory law* requires clarifying the adjective *multisensory*, the noun *law*, and how these terms are related.'[37] The term *law* can be understood by drawing on legal theory, the doctrine of the sources of law, legal informatics, and popular legal culture. Hence, law 'encompasses the sources of law in a wide sense (including verbal sources of law in a strict sense, state legal practice in a strict sense, customary law, and jurisprudence—that is, legal research and education), legal practice (comprising state legal practice in a wide sense and private legal practice), the contents of justice, legal and legally relevant facts, the contents of [high and; my insertion] popular legal culture, and further legally relevant contents.'[38]

'As regards the adjective *multisensory*, the psychology of perception, learning psychology, and the neurosciences distinguish between *stimuli* and their perception. Thus, multisensory implies that human beings are affected by two or more different external or internal stimuli. These stimuli are different because they address various human sensory systems, such

36 See Colette R. Brunschwig, 'Multisensory Law and Legal Informatics—A Comparison of How these Legal Disciplines Relate to Visual Law', *Structuring Legal Semantics: Festschrift for Erich Schweighofer*, eds. Anton Geist et al. (Bern: Editions Weblaw, 2011), 581-617, 573-667, also available at: http://jusletter-eu.weblaw.ch/service/login.html?targetPage=http%3A%2F%2Fjusletter-eu.weblaw.ch%2FmagnoliaPublic%2Fjusletter-it%2Fissues%2F2011%2F104%2Farticle_324.html (last accessed on 4 February 2013); see also my paper on 'Multisensory Law and Therapeutic Jurisprudence', 713-714.

37 Id., 'Multisensory Law and Therapeutic Jurisprudence', 713.

38 Ibid.

as the visual sensory system, the auditory sensory system, or indeed both, and so forth. Moreover, these stimuli coincide in space and time. Regarding the effect of these stimuli on human perception, two or more perceptive systems are constantly and simultaneously active.'[39]

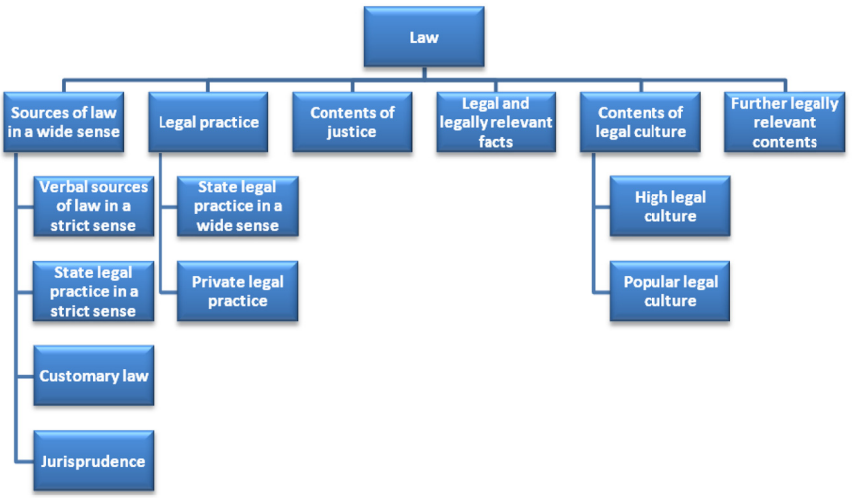

Figure 12.1: The term 'law'.

Further, the terms 'multisensory' and 'law' are related thus: 'The adjective multisensory modifies the noun law. *Multisensory* tells us what kind of *law* is at stake—namely, a law that is *multi*-sensory with all its implications.'[40]

12.2.2. Subject matter and cognitive interest of multisensory law

12.2.2.1. Multisensory law: subject matter

'What is the subject matter of multisensory law? Put simply, this emerging legal discipline'[41] explores 'the sensory phenomena of the law',[42] be they unisensory (i.e., visual, auditory, kinaesthetic, and so forth) or multisens-

39 Brunschwig, 'Multisensory Law and Therapeutic Jurisprudence', 713.
40 Id., 'Multisensory Law and Therapeutic Jurisprudence', 714.
41 Brunschwig, 'Multisensory Law and Therapeutic Jurisprudence', 714.
42 Ibid.

ory (i.e., audiovisual, tactile-kinaesthetic, visual-kinaesthetic, and so forth). Multisensory law focuses primarily on the law as a uni- and multisensory phenomenon within and outside the legal context. It deals only marginally with the uni- and multisensory phenomena in the legal sources in a strict sense, because they are explored chiefly by the established legal disciplines of applicable law.

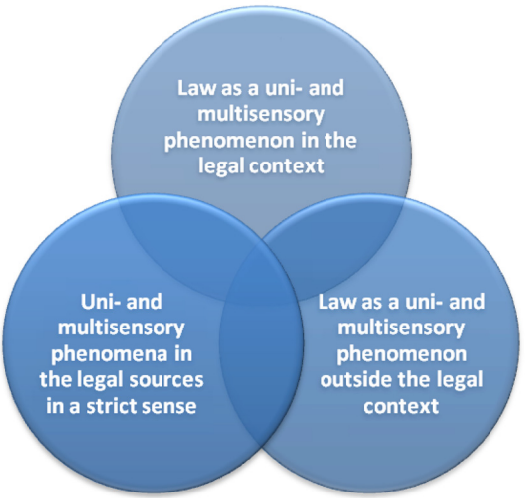

Figure 12.2: Multisensory law: the threefold subject matter.

12.2.2.1.1. Uni- and multisensory phenomena in the legal sources in a strict sense

Generally, the established disciplines of the applicable law and the basic legal disciplines explore the unisensory and multisensory phenomena in the legal sources in a strict sense. Multisensory law as such does not presume to compete with these legal disciplines, but seeks to draw their attention to questions otherwise neglected, discussed inadequately, or which might benefit from additional insights. In so doing, multisensory law adopts questions and insights from non-legal disciplines dealing specifically with sensory phenomena. Thus, multisensory law might provide a deeper and a broader view, perhaps even a meta-perspective, on the sensory phenomena of the law. I illustrate multisensory law's ancillary function below (6.3.1.2).

12.2.2.1.2. Law as a uni- and multisensory phenomenon in the legal context

The law appears as a unisensory and multisensory phenomenon in the legal context. As shown (Figure 12.1), '[i]ts foundations include sources of law in a wide sense, legal practice, justice-related contents, and legal or legally relevant facts. These foundations are part of the law as a uni- and multisensory phenomenon'[43] in the legal context. I exemplify the law as a multisensory phenomenon in the legal context below (3).

12.2.2.1.3. Law as a uni- and multisensory phenomenon outside the legal context

Law as a unisensory and multisensory phenomenon *outside* the legal context. refers to the contents of high and popular legal culture and to further legally relevant contents. For FRIEDMAN, legal culture is 'nothing more than the "ideas, attitudes, values, and opinions about law held by people in a society". … Legal culture refers to those ideas and attitudes which are specifically legal in content—ideas about courts, justice, the police, the Supreme Court, lawyers, and so on.'[44]

What does '*high* legal culture' mean? It refers to works of art. The art-and-law movement studies these phenomena as well: 'The power of spiritual, edifying icons is celebrated in every courtroom: in the wigs, robes, and other theatrical paraphernalia of legal performance and in the images of justice that adorn our public buildings.'[45] DOUZINAS & NEAD argue that '[t]he relationship between law and art can be analytically distinguished into two components: law's art, the ways in which political and legal systems have shaped, used, and regulated images and art, and art's law, the representation of law, justice, and other legal themes in art … Cesare Ripa's *Iconologia*, published in 1593, proposes a number of legal images, including justice and injustice.'[46]

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43 Brunschwig, 'Multisensory Law and Legal Informatics.' 593.

44 Lawrence M. Friedman, 'Law, Lawyers, and Popular Culture,' *Popular Culture and Law*, ed. Richard K. Sherwin (Hants, Burlington, VT: Ashgate, 2006), 3, 3-30.

45 Costas Douzinas & Lynda Nead, 'Introduction,' *Law and the Image*, eds. Costas Douzinas and Lynda Nead (Chicago, IL, London: The University of Chicago Press, 1999), 9, 1-15.

46 Douzinas & Nead, 'Introduction,' 11.

Writing on *popular* culture, FRIEDMAN states that the term 'refers first, and more generally to the norms and values held by ordinary people, or at any rate, by non-intellectuals, as opposed to high culture, the culture of intellectuals and the intelligentsia, or what Robert Gordon has called 'mandarin culture'. Second, and more narrowly, it refers to 'culture' in the sense of books, songs, movies, plays, television shows, and the like; but specifically to those works of imagination whose intended audience is the public as a whole, rather than the intelligentsia: Elvis rather than Marilyn Horne.'[47]

Drawing on FRIEDMAN, ASIMOW & MADER outline two semantic aspects of 'popular legal culture'. The first, they argue, 'refers to the entire universe of knowledge, behaviors, beliefs, and attitudes that circulate in a particular society or subgroup of that society … popular legal culture refers to everything people know or think they know about law, lawyers, and the legal system.'[48] The second, in their view, 'includes commercial texts (such as movies, TV shows, or novels) about law, lawyers, or the legal system.'[49]

Hence, the second meaning of 'popular legal culture' means the products of the visual and audio-visual mass media, including motion pictures[50] and television films,[51] which show legal and legally relevant contents to a broad audience.[52] Other forms include either real or fictional trial movies[53] and court TV—the latter in a real[54] or fictional[55] version.

47 Friedman, 'Law, Lawyers, and Popular Culture,' 3.

48 Michael Asimow & Shannon Mader, *Law and Popular Culture: A Coursebook* (New York, NY, et al.: Peter Lang, 2007), 4.

49 Id., *Law and Popular Culture*, 4.

50 See Michael Asimow, 'Popular Culture Matters,' *Lawyers in Your Living Room! Law on Television*, ed. Michael Asimow (Chicago, IL: ABA Publishing, 2009), xix-xxvi, and Elayne Rapping, 'Introduction: The History of Law on Television,' *Lawyers in Your Living Room! Law on Television*, ed. Michael Asimow (Chicago, IL: ABA Publishing, 2009), xxvii-xxxv.

51 See Asimow, 'Popular Culture Matters,' xix-xxvi, and Rapping, 'Introduction', xxvii-xxxv.

52 See William P. MacNeil, *Lex Populi*: *The Jurisprudence of Popular Culture* (Stanford, CA: Stanford University Press, 2007), 1 and *passim*; Richard K. Sherwin, *When Law Goes Pop*: *The Vanishing Line between Law and Popular Culture* (Chicago, IL, London: The University of Chicago Press, 2002), 3 sqq., 15 sqq., and 141 sqq., and Steve Greenfield, Guy Osborn & Peter Robson, *Film and the Law*: *The Cinema of Justice*, 2nd ed. (Oxford, Portland, OR: Hart Publishing, 2010), 16.

Further legally relevant contents 'comprise the remaining legally relevant contents which cannot be subsumed under the categories of 'law' hitherto enumerated.'[56] One example are legal visualisations including psychological contents. In a book on couples therapy, BODENMANN 'has developed a verbo-visual model based on stress theory to explain the possible causes of divorce.'[57] Such a legal visualisation could be used in family mediation or in divorce law lawyering 'to explain which factors have potentially contributed to the existing conflict and therefore to the possibly imminent divorce.'[58] When such a legal visualisation is applied in the legal context, one could also classify it as a visual phenomenon in the legal context. Thus, whereas the three spheres of multisensory law are interrelated, delimiting them sometimes proves difficult or near-to impossible.

12.2.2.2. Multisensory law: cognitive interest

The cognitive interest of multisensory law can be formulated in terms of various key questions.[59] BENTLY, for instance, asks: 'How does law sense? What does law understand to be the nature of our senses? How does law constitute our notions of the senses? How does law control or regulate our senses? How does law use our senses? Which senses does law use?'[60]

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53 See Paul Bergman & Michael Asimow, *Reel Justice: The Courtroom Goes to the Movies* (Missouri, MO: Andrews and McMeel, 1996), 1 sqq., and Greenfield, Osborn, & Robson, *Film and the Law*, 52 sqq.

54 On real court TV, see http://www.trutv.com/newname.html (last accessed on 4 February 2013).

55 On fictional court TV, see Taunya Lovell Banks, 'Judging the Judges—Daytime Television's Integrated Reality Court Bench,' *Lawyers in Your Living Room! Law on Television*, ed. Michael Asimow (Chicago, IL: ABA Publishing, 2009), 309-320, and Stefan Machura, 'German Judge Shows: Migrating from the Courtroom tot he TV Studio,' *Lawyers in Your Living Room! Law on Television*, ed. Michael Asimow (Chicago, IL: ABA Publishing, 2009), 321-332.

56 Brunschwig, 'Multisensory Law and Legal Informatics,' 591.

57 Id., 'Multisensory Law and Therapeutic Jurisprudence,' 718. See Guy Bodenmann, *Verhaltenstherapie mit Paaren: Ein modernes Handbuch für die psychologische Beratung und Behandlung* (Bern et al.: Verlag Hans Huber, 2004), 36, *fig.* 9.

58 Brunschwig, 'Multisensory Law and Therapeutic Jurisprudence,' 718.

59 Id., 'Multisensory Law and Therapeutic Jurisprudence,' 714.

60 Lionel Bently, 'Introduction,' *Law and the Senses: Sensational Jurisprudence*, eds. Lionel Bently & Leo Flynn (London, Chicago, IL: Pluto Press, 1996), **2**, 1-17.

12.2.2.2.1. Uni- and multisensory phenomena in the legal sources in a strict sense: cognitive interest

Several of BENTLY's questions—What does law understand to be the nature of our senses? How does law constitute our notions of the senses? How does law control or regulate our senses?—concern the cognitive interest regarding the unisensory and multisensory phenomena in the legal sources in a strict sense. Here are some further key questions: Which senses does law *not* control or regulate? Why, to what end, and with which effect does law (not) control or regulate our senses?

12.2.2.2.2. Law as a uni- and multisensory phenomenon in the legal context: cognitive interest

Again, several of BENTLY's questions—How does law sense? How does law use our senses? Which senses does law use?—can be related to the law as a unisensory and multisensory phenomenon within the legal context.

For instance, how does traffic law—as a source of law in the strict sense—sense? Does traffic law sense *visually*? How do the verbal sources of law in a strict sense—for instance, patent law—use our visual sense? How does patent law use sight? Considering such questions, BOEHME-NESSLER points to the 'shadowy existence'[61] of images in modern law. 'Legal texts—whether laws, judgements or learned documents—on the whole contain no images or graphics. Text-books without images are almost symbolic of the subject of law. Although even here—as in all things in life—the exceptions prove the rule. The Highway Code with its images of traffic signs and signals is the most obvious example. And in the fields of invention, patent and brand ownership, law images are not just normal, they are indispensable.'[62] Given today's visual and audio-visual (legal) culture, other laws could be presented as visual or audio-visual phenomena in the future. How does legal practice in a strict sense (court decisions and decisions of administrative bodies) use our visual sense? One use of sight, as mentioned, are legal visualisations in court judgments. Such visualisations could be subsumed under court decisions as visual phenomena or rather as verbo-visual phenomena.[63] Likewise, how does jurisprudence, particularly legal educa-

61 Boehme-Nessler, *Pictorial Law,* 105.

62 Ibid.

63 Brunschwig, 'Legal Visualizations in Court Judgments', [s.p.].

tion, use sight and hearing? Legal education films for law students belong to legal education as an audio-visual phenomenon.[64]

12.2.2.2.3. Law as a uni- and multisensory phenomenon outside the legal context: cognitive interest

Adapting BENTLY's questions to the extralegal context, how does law sense outside the legal context? What does the extra-legal context consider to be the nature of law's senses? How does the extralegal context use law's senses or rather how does it represent the law as a unisensory and multisensory phenomenon?[65] As this context is not important in this paper, I dispense with illustrating these questions with concrete examples.

12.3. Law as a multisensory phenomenon in the legal context: trend toward multisensory digital legal communication practices

How do multisensory digital media impact the law? Is there already a trend toward the law as a multisensory phenomenon, that is, toward multisensory digital legal communication practices? If so, what does this trend look like? If not yet, what might such a trend look like?

12.3.1. Virtual reality (VR) in the legal context

12.3.1.1. Virtual reality: a rough outline

Definitions of VRs abound. FURHT, for instance, describes VR as '… the technology that provides almost real and/or believable experiences in a synthetic or virtual way.'[66] To provide such experiences, 'virtual reality uses the entire spectrum of current multimedia technologies such as image, video, sound and text, as well as newer and upcoming media such as e-

64 Colette R. Brunschwig, 'Legal Education Films for Law Students', available at: http://community.beck.de/gruppen/forum/audio-visual-law/legal-education-films-for-law-students (last accessed on 4 February 2013). These few examples must suffice here. For an in-depth discussion, see my 'Multisensory Law and Legal Informatics,' esp. 603-606. See also section 3 below.

65 See Brunschwig, 'Multisensory Law and Legal Informatics,' 607.

66 Borko Furht, 'Virtual Reality,' *Encyclopedia of Multimedia A-Z*, ed. Borko Furht, 2nd ed. (New York, NY: Springer, 2008), 968.

touch, e-taste, and e-smell. To define the characteristics of VR, Heim … used the three "I"s, *immersion, interactivity and information intensity*.'[67]

There is no space to further describe virtual realities in terms of hard- and software (media-related aspects)[68] or in a semiotic sense (code-related aspects). Whereas these aspects are also essential in relation to multisensory law, let us consider the sensory implications of virtual reality. STEUER writes that

'The key to defining virtual reality in terms of human experience rather than technological hardware is the concept of presence. Presence can be thought of as the experience of one's physical environment; it refers not to one's surroundings as they exist in the physical world, but to the perception of those surroundings as mediated by both automatic and controlled mental processes … *Presence is defined as the sense of being in an environment*. Many perceptual factors help to generate this sense, including input from some or all sensory channels, as well as more mindful, attentional, perceptual, and other mental processes that assimilate incoming sensory data with current concerns and past experiences …'[69]

Reflecting on the connection between presence and perception, STEUER remarks that 'when perception is mediated by a communication technology, one is forced to perceive *two* separate environments simultaneously: the physical environment in which one is actually present and the environment presented via the medium. The term telepresence can be used to describe the precedence of the latter experience in favour of the former; that is, telepresence is the extent to which one feels present in the mediated environment, rather than in the immediate physical environment.'[70]

On the vividness of virtual realities, a much-discussed topic, STEUER points out that this depends on sensory breadth and depth.[71] Sensory

67 Ibid. On virtual reality, see also Alistair Sutcliffe, *Multimedia and Virtual Reality: Designing Multisensory User Interfaces* (Mahwah, NJ, London: Lawrence Erlbaum Associates, Publishers, 2003), 9-23.

68 See instead Kay M. Stanney & Joseph v Cohn, 'Virtual Environments,' *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications*, ed. Julie A. Jacko (Boca Raton, London, New York, NY: CRC Press, 2012), 644-650, 643-667.

69 Jonathan Steuer, 'Defining Virtual Reality: Dimensions Determining Telepresence,' *Journal of Communication*, Vol. 42, No. 4 (1992), 75, 73-93.

70 Steuer, 'Defining Virtual Reality', 75-76.

71 See id., 'Defining Virtual Reality', 81.

breadth 'refers to the number of sensory dimensions simultaneously presented',[72] whereas sensory depth concerns 'the resolution within each of these perceptual channels'.[73]

Virtual reality, therefore, applies to computer-simulated, three-dimensional environments. These surroundings are capable of simulating indoor and outdoor spaces in the real world or in imagined worlds with all their uni- and multisensory implications.

Legal discourse has started exploring virtual reality. FEIGENSON & SPIESEL draw our attention to three types of virtual reality. The first 'refers to completely computer-generated pictures, offering a greater or lesser illusion of three-dimensionality. This category includes still and moving pictures, as well as dynamic environments that can be explored interactively (video games are an example).'[74] The second type is *augmented virtuality*, where 'virtual pictures are augmented by data drawn from the real world (photographs, for instance)'.[75] The third is an 'immersive virtual environment', where 'people put on equipment, typically some sort of headpiece and gloves with sensing devices, in order to enter and interact in a three-dimensional simulation of an environment.'[76]

LEONETTI & BAILENSON describe immersive virtual reality (IVE) as 'an artificial, interactive, computer-generated scene or "world" within which a user can immerse herself.' Considering its sensory implications, they argue that 'IVEs combine high-resolution, stereoscopic projection and three-dimensional computer graphics to create a complete sense of presence in a virtual environment. IVEs consist of immersion in an artificial environment in which the users feel just as perceptually surrounded as they do in "reality". IVEs produce a simulated yet interactive reality in real time, which can support spatialized sound and virtual touch … Common examples of IVEs are certain computer games, training programs such as flight and driving simulators, and immersive and interactive art installations.'[77]

72 Ibid.
73 Ibid.
74 Feigenson & Spiesel, *Law on Display*, 164.
75 Ibid.
76 Ibid.
77 Carrie Leonetti & Jeremy Bailenson, 'High-Tech View: The Use of Immersive Virtual Environments in Jury Trials', *Marquette Law Rev.*, Vol. 93 (2010), 1075-1076,

Importantly, IVEs are capable of multisensorily recreating the facts of a case: 'IVEs are, in a sense, expert environments. The IVE is not just a snapshot of the scene [e.g., a crime scene, scene of an accident; my insertion], but rather a computer model created to represent the scene. An expert witness is needed to explain to the inexpert jury the array of sophisticated methodological and interpretative techniques and assumptions that were involved in the creation of the IVE.'[78]

Figure 12.3: Immersive virtual reality: the sensory breadth.

12.3.1.2. Virtual reality as multisensory evidence

12.3.1.2.1. Augmented virtual reality as multisensory evidence

The second Bloody Sunday Trial serves as a case in point for using multisensory evidence in court. In this trial '[a]ugmented virtuality was used'.[79] The facts of the case: 'On Sunday, the 30th January 1972, thirteen people

1073-1120.

78 Id., 'High-Tech View,' 1100.

79 Feigenson & Spiesel, *Law on Display*, 166. See also Neal Feigenson & Christina Spiesel, 'The Juror and Courtroom of the Future,' *The Future of Evidence: How Science & Technology Will Change the Practice of Law*, eds. Carol Henderson & Jules Epstein (Chicago, IL: American Bar Association, 2011), 115-116, 113-136.

were killed by British soldiers on the streets of Derry. The circumstances in which they died have been the subject of enormous on [sic] ongoing controversy.'[80] There were two trials on the events that occurred on that day. Prior to the second trial, 'an interactive virtual reality system was developed specifically for use by the Bloody Sunday Tribunal in order to aid the orientation of witnesses when they gave their evidence.'[81] This reality 'consisted of thousands of photographs and computer-generated images of Derry, both present day and as it was in 1972. A combination of this application and touchscreen technology used in the hearing chamber allowed users to virtually walk the streets of Derry. Once a witness was viewing a particular "hotspot", he or she could view the scene from all angles. Witnesses could also draw arrows on the screen to record movements or events which they saw.'[82]

WHELAN comments on the positive effects of such multisensory evidence:

> 'The idea of bringing all of that information together into a virtual reality reconstruction (and including new images where necessary) proved to be of great assistance to the lawyers and witnesses trying to make sense of the complex events which occurred decades previously. Continuous reference was made to the photographs and maps, as well as the virtual reality recreation of 1972 Derry, especially as some buildings had been demolished since 1972.'[83] He suggests that the VR system 'made it possible to pose questions and to test witnesses' memories in a way that would not have been possible with photographs and maps.'[84]

Thus, virtual reality can or could be used as multisensory evidence in criminal trials 'to re-create crime scenes, impeach the testimony of an unreliable witness, test assertions, and enhance a jury's understanding of disputed events.'[85] Which scene(s) could be virtually recreated? According to

80 Darius Whelan, 'The Bloody Sunday Tribunal Video Simulation,' *Visual Practices Across the Universities*, ed. James Elkis (Munich: Wilhelm Fink Verlag, 2007), 101, 100-103.

81 Whelan, 'The Bloody Sunday Tribunal Video Simulation,' 101.

82 Ibid.

83 Id., 'The Bloody Sunday Tribunal Video Simulation,' 102.

84 Id., 'The Bloody Sunday Tribunal Video Simulation,' 103.

85 Leonetti & Bailenson, 'High-Tech View,' 1076.

LEONETTI & BAILENSON, virtual reality involves 'the configuration of streets, driveways, buildings), episodes or events (appearances, sizes, and shapes), and abstract factual material (trends, relationships) as visual images rather than as strings of spoken or written text.'[86] A multisensory virtual reality, moreover, 'would permit a sufficiently, if not more, accurate view of the crime scene and its pertinent details (the position of the body, the location where the weapon was discovered, the fatal wounds) without the blood and guts of video and still photographs.'[87]

12.3.1.2.2. Immersive virtual reality as multisensory evidence

As observed (3.1.1), immersive virtual reality can or could be used as multisensory evidence in criminal trials. LEONETTI & BAILENSON suggest a further application of immersive virtual realities in criminal trials:

> 'Second, the use of an IVE representing the events in question, created by a VR expert after consultation with the defense team or review of pretrial discovery materials might provide a vehicle for a criminal defendant to introduce evidence of her version of events before the jury and permit the jury to test that version without the defendant having to waive her Fifth Amendment privilege against self-incrimination. For example, imagine a murder prosecution where the defense is mistaken self-defense. The defendant is claiming that she shot someone in an alley that she believed was attacking her, when in fact the person was in the alley for innocent reasons unrelated to the defendant. The primary issue at trial is the reasonableness of the defendant's mistaken belief … With an IVE, a VR expert could generate an IVE, taking into account all parties' versions of events, permitting the jury to see the alley through the defendant's eyes without the inherent risks entailed with the waiver of her Fifth Amendment privilege through live testimony.'[88]

Also from a legal perspective, FEIGENSON & SPIESEL claim that '[o]ne can readily imagine legal uses for IVEs [= immersive virtual realities; my insertion].' One use, for instance, would be 'to provide a "virtual jury view", a good way for jurors to "visit" a crime or accident scene without leaving the courtroom.' Citing the legal scholar Frederic Lederer, they fur-

86 Id., 'High-Tech View,' 1077.
87 Id., 'High-Tech View,' 1116.
88 Id., 'High-Tech View,' 1116-1117.

ther observe that an IVE could be used 'to determine what a witness could have seen in an operating room in a hypothetical torts case involving a medical device malfunction. The witness was able to move around the virtual operating room while observers in the courtroom could see on a large screen what the witness was seeing.'[89]

12.3.1.3. Multisensory virtual reality for people with disabilities

Multisensory virtual realities are increasingly being developed for people with disabilities.[90] There are 'applications in the fields of spatial learning, special education and physical rehabilitation.'[91] The field of spatial learning concerns blind people in particular. Emphasisng the benefit of multisensory virtual realities for the blind, LAHAV & MIODUSER write that:

> 'The ability to navigate space independently, safely and efficiently is a combined product of motor, sensory and cognitive skills. This ability has direct influence in the individuals' quality of life. Mental mapping of spaces, and of the possible paths for navigating through these spaces, is essential for the development of efficient orientation and mobility skills. Most of the information required for this mental mapping is visual information … Blind people lack this crucial information, thus facing great difficulties (a) in generating efficient mental maps of spaces, and therefore (b) in navigating efficiently within these spaces.'[92]

Moreover, the deficit 'in the visual channel should be compensated with information perceived via other senses, e.g., touch and hearing.'[93] Crucially, multisensory virtual realities support blind people in the 'acquisition of orientation and mobility skills, by compensating the deficiencies of the

89 Feigenson & Spiesel, *Law on Display*, 167.

90 See Paul N. Wilson, Nigel Foreman, & Danaë Stanton, 'Virtual reality, disability, and rehabilitation,' *Disability and Rehabilitation*, Vol. 19, No. 6 (1997), 214, 213-220.

91 Ibid.

92 Orly Lahav & David Mioduser, 'Multisensory Virtual Environment for Supporting Blind Persons' Acquisition of Spatial Cognitive Mapping—a Case Study,' Research Report No. 69, [s.l.] [s.t.], 1, 1-6, available at: http://muse.tau.ac.il/publications/larticle.html (last accessed on 4 February 2013).

93 Ibid.

impaired channel.'[94] Multisensory virtual realities enable 'blind people to learn about different (real life) spaces that they are required to navigate (e.g., shool, work, place, public buildings).'[95] And such realities 'provide the opportunitiy to practise real-world tasks free from real hazards.'[96]

12.3.1.4. Multisensory virtual reality for blind legal actors

Based on LAHAV & MIODUSER, I would suggest the use of multisensory virtual realities for blind legal actors, such as law professors, law students, lawyers, judges, policemen, public officials, members of parliament, prosecutors, persons involved in legal conflicts or in other public or private legal matters, and so forth. Thus, such legal actors would be empowered to learn more about their various workplaces, for instance, their university, department, libraries, and so forth. Such multisensory virtual realities might also be offered to blind members of other faculties. Multisensory virtual realities would assist practicing lawyers, judges, policemen, public officials, members of parliament, prosecutors, and persons involved in legal conflicts or in other public or private legal matters in better orienting themselves in courts, agencies, legislative bodies, prisons, and other professional surroundings.

12.3.2. Brain-computer interfaces (BCIs) in the legal context

12.3.2.1. Brain-computer interfaces: a rough outline

PANTKE describes a brain-computer interface as 'a special human-machine interface that connects the brain with a computer without the use of limbs or any motor activity.'[97] He further observes that 'with the help of a

94 Id., 'Multisensory Virtual Environment for Supporting Blind Persons,' 2.

95 Id., 'Multisensory Virtual Environment for Supporting Blind Persons,' 2.

96 Wilson, Foreman, & Stanton, 'Virtual reality, disability, and rehabilitation,' 215.

97 Karl-Heinz Pantke, 'Was sind hämodynamische und elektrophysiologische Systeme? Was sind Elektroenzephalographie (EEG), Magnetenzephalographie (MEG), funktionelle Magnet-Resonanz-Tomographie (fMRT) und funktionelle Nah-Infrarot-Spektroskopie (fNIRS)? Was sind Paradigmen für Brain-Computer-Interfaces?' *Mensch und Maschine, Wie Brain-Computer-Interfaces und andere Innovationen gelähmten Menschen kommunizieren helfen*, ed. Karl-Heinz Pantke (Frankfurt am Main: Mabuse-Verlag, 2010), 9, 9-19. N.B. This passage and those

brain computer interface, entirely paralyzed persons are able to work with a computer'.[98] This concerns human-machine communication and the information in the brain is 'coded as bioelectrical impulses'.[99] Machine-human communication in BCI cases 'takes place via the sensory systems of the human body, that is, through optical and acoustic stimuli made available via screens or loudspeakers.'[100]

Recently, BCIs have been developing from visually- to *multisensorily*-oriented systems. Reflecting on the rapid development of BCIs over the past decade, WAGNER, DALY, & VÄLJAMÄE observe that

'most of these interfaces rely on the visual modality for providing users with control and feedback signals. Only a few research groups have been studying non-visual BCIs, primarily based on auditory and, rarely, on somatosensory signals. For severely disabled patients with poor vision, non-visual BCI approaches may be the only option … Gradually decreasing, or even complete loss of eye-movement control prevents the use of common BCI technologies that rely on visual displays and spatial vision … Similarly, many potential BCI users can have cortical or subcortical lesions, which may lead to neuropsychological conditions such as hemineglect or agnosia that make it difficult or even impossible to focus attention on visual stimuli. For non-visually impaired BCI users, there are strong neurophysiological reasons to use *multisensory BCIs* [my emphasis].'[101]

According to PANTKE, BCI systems can neither visualise nor uncover thoughts.[102] Despite this qualification, WALTER asks 'why is it so obvious to talk about reading thoughts?' In response, he argues that:

> 'Because in certain contexts it is relatively simple to interpret brain signals. For instance, in the area of sensomotor function it is possible to locate the regions with the help of fMRT. They code touch and movement and are relatively firmly 'wired.' Even if persons merely imagine to move something, typical signal changes become apparent in these regions. The latter are so reliable that through skilfully connecting EEG and peripheral

cited below have been translated from the German.

98 Id., 'Was sind hämodynamische und elektrophysiologische Systeme?' 9.

99 Id., 'Was sind hämodynamische und elektrophysiologische Systeme?' 10.

100 Ibid.

101 Wagner, Daly, & Väljamäe, 'Non-visual and Multisensory BCI Systems,' 375. Similarly see id., 'Non-visual and Multisensory BCI Systems,' 388.

102 See Pantke, 'Was sind hämodynamische und elektrophysiologische Systeme?' 11.

> devices, experimental subjects using their thoughts (that is, by imagining movement) can handle a typewriter, play flipper or operate prostheses (to some extent). Furthermore, within specialised regions of the brain concerned with processing movement, colour, faces, body parts, or houses, it is possible to distinguish whether an experimental subject directs her or his attention to houses or faces offered simultaneously, of if she or he is thinking of one of the two objects …'[103]

Moreover, 'one can argue about whether one calls this reading thoughts —one might rather call it 'reading brain signals.' But at least it is possible to reliably discern from the brain signals whether someone is thinking of a house, a face, a body part, or of movement, provided that the experiment is well designed.'[104]

WAGNER, DALY, & VÄlJAMÄE also suggest that BCIs are capable of encoding thoughts: 'Several strategies for BCI control involve a different type of mental activity—kinaesthetic or visual imagination of movement, auditory imagination of music, and speech. Some of these tasks are non-visual, and some have been used in combination with non-visual feedback.'[105] Discussing speech-oriented BCIs, they observe that 'An idea for improving the intuitiveness of BCI operation is to base control upon the imagination of speech. In such a paradigm the user would simply be asked to imagine speaking a control command in order to enact control. For example, to operate a wheel chair to go left they might imagine speaking the word 'left.' More interestingly, such a paradigm could theoretically be used to make a highly intuitive and fast BCI speller.'[106]

103 Henrik Walter, 'Was können wir messen? Neuroimaging—eine Einführung in methodische Grundlagen, häufige Fehlschlüsse und ihre mögliche Bedeutung für Strafrecht und Menschenbild', *Von der Neuroethik zum Neurorecht?* eds. Stephan Schleim, Tade Matthias Spranger, & Henrik Walter (Göttingen: Vandenhoeck & Ruprecht, 2010), 77, 67-103. N.B. This passage and those cited below have been translated from the German.

104 Id., 'Was können wir messen?' 77-78.

105 Wagner, Daly, & Väljamäe, 'Non-visual and Multisensory BCI Systems,' 382.

106 Id., 'Non-visual and Multisensory BCI Systems,' 384.

12.3.2.2. Multisensory brain-computer interfaces and legal actors with aphasia

12.3.2.2.1. On aphasia

The website of the *National Aphasia Association* (US) includes a page where FAQs about aphasia are answered in a generally intelligible way. Thus, 'Aphasia is an *acquired communication disorder that impairs a person's ability to process language, but does not affect intelligence*. Aphasia impairs the ability to speak and understand others, and most people with aphasia experience difficulty reading and writing.'[107] Persons unable to speak and/or write suffer from *expressive aphasia*. Those unable to understand spoken and/or written language suffer from *receptive aphasia*. This kind of language disorder can also involve both types of aphasia.[108] What are the causes of aphasia? 'The most common cause of aphasia is stroke … It can also result from head injury, brain tumor or other neurological causes.'[109]

As a rule, neither expressive nor receptive aphasia affects a person's intelligence: 'A person with aphasia *may have difficulty retrieving words and names, but the person's intelligence is basically intact*. Aphasia is not like Alzheimer's disease; for people with aphasia *it is the ability to access ideas and thoughts through language—not the ideas and thoughts themselves—that is disrupted*. But because people with aphasia have difficulty communicat-

107 The National Aphasia Association, 'Aphasia Frequently Asked Questions,' [s.p.], available at: http://www.aphasia.org/Aphasia%20Facts/aphasia_faq.html (last accessed on 4 February 2013). See also Georg Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen', *Globale Sicherheit und proaktiver Staat—Die Rolle der Rechtsinformatik, Tagungsband des 13. Internationalen Rechtsinformatik Symposions IRIS 2010*, eds. Erich Schweighofer, Anton Geist, & Ines Staufer (Wien: Österreichische Computergesellschaft, 2010), 574-575, 573-578.

108 See Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 574-575, and id., 'Willensbildung bei Personen mit einer Störung des Sprachverstehens,' *Europäische Projektkultur als Beitrag zur Rationalisierung des Rechts, Tagungsband des 14. Internationalen Rechtsinformatik Symposions IRIS 2011*, eds. Erich Schweighofer & Franz Kummer (Vienna: Österreichische Computer Gesellschaft, 2011), 585-587.

109 The National Aphasia Association, 'Aphasia Frequently Asked Questions,' [s.p.]. See also Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 574.

ing, others often mistakenly assume they are mentally ill or have mental retardation.'[110]

The following two questions are crucial for this paper: How is it possible to communicate with aphasic persons? How is it possible for them to communicate? Since communication usually involves more than one person, these questions are interconnected. In order to answer these questions as clearly as possible, I shall, however, tackle them separately.

As regards communicating with aphasic persons, *The National Aphasia Association* (US) makes many helpful suggestions,[111] including to '*[a]ugment speech with gesture and visual aids* whenever possible.'[112] How do aphasic persons communicate? NEWESELY, an Austrian lawyer *and* speech therapist, points out that aphasic persons can be encouraged to use nonverbocentric communicative media, whether they are digital or not:

> 'Communicative resources include, for instance, the deployment of the body's own alternative forms of communication and the application of non-electronic and electronic communicative aids. Especially nonverbal forms of communication are practically relevant for aphasic persons. They can make statements with their body's own forms of communication through conventional and generally agreed mimic signs, gazing and pointing, gestures, or possibly individual signs. As regards non-electronic communicative aids, boards, books, and posters can be applied, they contain a system of symbolic signs, such as the alphabet, PECS, TEACHH, or BLISS, or drawings and photographs, which are organized according to content-related aspects. In response to a question, the aphasic person indicates the right answer on a communication board or looks at it.'[113]

110 Ibid. Similarly, see Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 574.

111 See The National Aphasia Association, 'Communicating With People Who Have Aphasia: Some "Do's & Dont's",' [s.p.], available at: http://www.aphasia.org/Aphasia%20Facts/communicating_with_people_who_have_aphasia.html (last accessed on 4 February 2013).

112 Ibid. Similarly, see Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 575-576, and id., 'Willensbildung bei Personen mit einer Störung des Sprachverstehens,' 587, 589.

113 Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 575. N.B. This passage and those cited below have been translated from the German.

With respect to digital communication devices for aphasic persons, NEWESELY explains that 'electronic communication aids are … portable computers. On a keyboard one can produce language. The communicative contents can be represented in different ways on the electronic device, for instance, as words, phrases, or as complete messages.'[114] Besides verbal signs (words, phrases, complete messages), such a keyboard can also feature pictures. These verbo-pictorial keyboards are even better suited to aphasic persons.[115]

On future developments, NEWESELY comments that they 'run in the direction of neurotechnology, such as brain-computer interfaces. Certain mental activities which lead to changes of brain activity (brain waves) trigger control operations on a computer. The aphasic person can learn to influence certain brain waves through pushing her or his thoughts. The BCI would channel these waves from the skullcap in order to operate a spelling device or an oral communication program.'[116]

12.3.2.2.2. On legal actors with aphasia

Neurological damage, as a result of a stroke, brain tumor, head injury, or other causes,[117] might mean that legal actors (3.1.4) suffer from expressive, receptive, or both types of aphasia. And given that aphasic persons can have other disabilities, aphasic legal actors might also be otherwise handicapped. As observed, neither expressive nor receptive aphasia affects a person's intelligence: hence, aphasic legal actors might still have cognitive capacity, especially those affected by expressive aphasia. They might still be judicious, thus possess legal capacity, and be capable of entering into legal transactions. As a rule, legal actors need verbal skills to act (professionally). Nevertheless, under certain circumstances aphasic legal actors might still be able to perform their duties and/or rights. The availability or non-availability of digital and non-digital multisensory communication aids (media) determines these circumstances.

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114 Id., Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 575-576.

115 See id., 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 576.

116 Id., 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 576.

117 The National Aphasia Association, 'Aphasia Frequently Asked Questions,' [s.p.].

How can one communicate with aphasic legal actors? NEWESELY makes the following suggestions for communicating complex legal and legally relevant contents to such actors: 'It can substantially facilitate oral or/and written language comprehension to call on concrete illustrative objects or on pictures and to use nonverbal iconographic signs (familiar punctuation marks, e.g., exclamation marks, question marks; arrows to represent a logic sequence/procedure within block diagrams, simple Venn diagrams, simple flow charts, currency signs, signs for more/less to illustrate proportions, and so forth).'[118]

How do aphasic legal actors to communicate? Commenting on Austrian jurisdiction, NEWESELY emphasises that legal actors suffering from expressive aphasia are not excluded from legal dealing: 'As far as they are able to express their will through signs, initially, they can declare their intent where there is no provision (or requirement) as to form. As regards declarations of intent which require a specific form, they are able to make them in accordance with pertinent legal provisions, such as a notarial act or a notarial recording.'[119] In conclusion, NEWESELY notes that in addition to multisensory communication aids much depends on goodwill: 'Given an (exclusive) disturbance of language production, legally relevant declarations of intent seem to be possible, insofar as an aphasic person is capable of expressing her/himself nonverbally and finds an appropriate setting where she/he can act out her/his remaining communicative capacities, and insofar as the communication partners are prepared to deal with the particular communication possibilities.'[120]

12.3.2.2.3. Multisensory brain-computer interfaces for legal actors with aphasia

There is an ongoing debate on whether and how brain-computer interfaces might improve the situation of disabled legal actors. Referring to German jurisdiction, SPRANGER, a German legal scholar and political scientist, has recently observed the beginning of a debate 'on how to improve the

118 Newesely, 'Willensbildung bei Personen mit einer Störung des Sprachverstehens,' 589-590. See also id., 'Willensbildung bei Personen mit einer Störung des Sprachverstehens,' 590.

119 Newesely, 'Willensbildung bei Personen mit einer Störung des Sprachverstehens,' 586.

120 Ibid.

legal situation of disabled people through neuroscientific insights.'[121] In response, he remarks, that 'if new, communication channels so far undreamt of are being opened, thus the making of a legally binding declaration of intent by the affected people moves in tangible closeness.'[122] Crucially, however, 'It is barely impossible to foresee the range of emerging legal possibilities: To begin with, from limiting possible care relationships over the possibility of making a declaration of consent in the doctor-patient relationship ('informed consent') through to a patient's provision. It is possible to name countless constellations in which people with the most severe disabilities could regain a substantial amount of autonomy.'[123]

Emphatically, 'it is a matter of remedying existing discriminations caused by limited possibilities for making declarations of intent.'[124] Commenting on Austrian jurisdiction, NEWESELY states that conditional on 'their concrete clinical picture, aphasic persons might be able to make declarations of intent. In doing so, they might use different bodily forms of communication but also external non-electronic and electronic aids. That said, aphasic persons face real obstacles both in their legal and in their daily lives. In the rarest cases do they find their limitations considered in terms of their communicative abilities and enabling them to apply their remaining communicative abilities.'[125] Given multisensory brain-computer interfaces, legal actors suffering from expressive aphasia might learn how to use them in legal communication.[126] Thus, brain-computer interfaces contribute or might contribute to maintaining or restoring the legal capacity of aphasic or otherwise-disabled legal actors.

121 Tade Matthias Spranger, 'Rechtliche Implikationen der Generierung und Verwendung neurowissenschaftlicher Erkentnisse,' *Von der Neuroethik zum Neurorecht?* eds. Stephan Schleim, Tade Matthias, & Henrik Walter (Göttingen: Vandenhoeck & Ruprecht, 2009), 209, 193-213. N.B. This passage and those cited below have been translated from the German.

122 Ibid.

123 Ibid.

124 Id., 'Rechtliche Implikationen der Generierung und Verwendung neurowissenschaftlicher Erkentnisse,' 209.

125 Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 578.

126 See id., 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 576.

12.3.3. Movement-controlled systems in the legal context

12.3.3.1. Movement-controlled systems in general: a rough outline

Today, human machine-communication is also possible through bodily movement,[127] such as eye movement, nose movement, mouth movement, head movement, hand movement, finger movement, and so forth. Computers permitting such communication are subsumed under movement-tracking systems.[128] Discussing human-computer interaction, WELSH et al. observe that this 'is going through a period of rapid evolution. Although mouse, keyboard, and joystick devices will continue to dominate for the immediate future, embodied, gestural, and tangible interfaces—where individuals use their body to directly manipulate information objects—are rapidly changing the computing landscape.'[129] They cite a number of examples to substantiate this basic point.[130]

127 See Feigenson & Spiesel, 'The Juror and Courtroom of the Future,' 118-119.

128 See Karl-Heinz Pantke et al., 'Unterstützte Kommunikation bei erworbenen motorischen Einschränkungen,' *Mensch und Maschine: Wie Brain-Computer-Interfaces und andere Innovationen gelähmten Menschen kommunizieren helfen*, ed. Karl-Heinz Pantke (Frankfurt am Main: Mabuse-Verlag, 2010), 131-146; Julius Deutsch & Julia Gniffke, 'Open Source und Freie Software als Hilfsmittel zur Unterstützten Kommunikation,' *Mensch und Maschine: Wie Brain-Computer-Interfaces und andere Innovationen gelähmten Menschen kommunizieren helfen*, ed. Karl-Heinz Pantke (Frankfurt am Main: Mabuse-Verlag, 2010), 147-162, and Christian Lange, 'Blickgesteuerte Interaktion mit Peripheriegeräten—technische Lösung und ergonomische Absicherung', *Mensch und Maschine: Wie Brain-Computer-Interfaces und andere Innovationen gelähmten Menschen kommunizieren helfen*, ed. Karl-Heinz Pantke (Frankfurt am Main: Mabuse-Verlag, 2010), 163-181.

129 Timothy N. Welsh et al., 'Perceptual-Motor Interaction: Some Implications for Human-Computer Interaction,' *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications*, 3rd ed., ed. Juli A. Jacko (Boca Raton, London, New York, NY: CRC Press, 2012), 3, 3-20.

130 Ibid.

12.3.3.2. Movement-controlled systems in general for legal actors

Legal discourse is also exploring movement-controlled systems. FEIGENSON & SPIESEL, for instance, comment on 'using … natural bodily movements'[131] to control a computer device in court: 'If and when lawyers start to deploy these new kinds of display technologies in court, the effects will be hard to predict. By freeing trial lawyers from the laptop, mouse, and other paraphernalia, the technology would allow them to call up and display their pictures while maintaining a very direct relationship with their audience. It would also let the audience watch the lawyer command the information—perhaps seeming to turn the lawyer into a kind of magician.'[132]

12.3.3.3. Eye-movement-controlled systems: a rough outline

'Gaze detection refers to determining where a person is looking and is principally the domain of computer vision.'[133] *SMI SensoMotoric Instruments*, a company developing gaze- and eye-tracking systems,[134] speaks of *visual touch*.[135] In more precise sensory terms, I would rather talk about visual-kinaesthetic touch in human-machine communication.

Eye-tracking systems are used for different purposes, such as '[e]ducation (especially when combined with voice inputs)', '[r]esearch (such as microscopes with eye control)', '[g]aming (gaze control strategy and simulator PC games)', '[k]iosk (keyboard replacement)', and '[a]ssistive (gaze interaction for the physically challenged)'.[136] Eye-movement-controlled systems are particularly helpful for people with motor impairments.

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131 Feigenson & Spiesel, 'The Juror and Courtroom of the Future,' 118-119.

132 Id., 'The Juror and Courtroom of the Future,' 119.

133 Andrew D. Wilson, 'Sensor- and Recognition-Based Input for Interaction,' *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications*, 3rd ed., ed. Julie A. Jacko (Boca Raton, London, New York, NY: CRC Press, 2012), 137, 133-156.

134 See http://www.smivision.com/ (last accessed on 4 February 2013).

135 SMI SensoMotoric Instruments, 'Applications, Gaze-Based Interaction, Visual Touch—Your Look Turned into Action,' available at: http://www.smivision.com/en/gaze-and-eye-tracking-systems/applications/gaze-based-interaction.html (last accessed on 4 February 2013).

136 Ibid.

The so-called Tobii Ceye, a screen-keyboard featuring pictures and letters, [137] 'allows the user to just look at the display and control the mouse by blinking, dwelling and using the switch.'[138] With the help of this eye-movement-controlled screen-keyboard, persons who are both aphasic and paralysed could also convert its pictures into written text or speech.

12.3.3.4. Eye movement-controlled systems for paralysed legal actors with aphasia

According to NEWESELY, legal actors suffering from both aphasia and paralysis might use eye-movement-controlled systems: 'through simply fixing their gaze on a screen keyboard, they can choose a symbol.'[139] Depending on the respective jurisdiction, such multisensory digital media could enable or indeed re-enable aphasic and paralysed legal actors to produce legal consequences.

12.4. Further relevance of multisensory digital media to the law

This section briefly considers how multisensory digital media are or might be further legally relevant. I discuss these questions in terms of the strengths, weaknesses, opportunities, and threats of multisensory digital media. I restrict myself to the examples given in this paper, which clearly indicate that these media have or might have different impacts on the law.

137 See Sierra Monica B., 'Tobii Launches Devices with Symbols and Text to Speech Converter,' 29 January 2009, available at: http://www.techpin.com/tobii-launches-devices-with-symbols-and-text-to-speech-converter/ (last accessed on 4 February 2013).

138 Ibid. See also tobii, 'Independence with an Eye, Disabilities, Stroke/Aphasia,' available at: http://www.tobii.com/en/assistive-technology/global/disabilities/common-disabilities/strokeaphasia/ (last accessed on 4 February 2013), and tobii ATI, 'Independence with an Eye: Products, Tobii CEye Eye Control Module,' available at: http://www.tobii.com/en/assistive-technology/north-america/products/hardware/ceye-eye-control-module/ (last accessed on 4 February 2013).

139 Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 576.

12.4.1. Strengths

Improvement of truth seeking and finding. The second Bloody Sunday trial illustrates the use of 'virtual reality as multisensory evidence' (3.1.2) and shows how multisensory digital media may improve truth seeking and finding.

Empowerment, inclusion, and participation. There is no space to define the term *empowerment* in depth. Its different meanings depend on the various discourses exploring it. However, the above examples (3.1.4, 3.2.1, and 3.3.4) suggest that it makes sense to draw on disability studies and special needs education. From their perspectives, empowerment refers to authorising and to enabling persons with disabilities.[140] Empowering such persons leads to their inclusion and participation.[141] Multisensory virtual realities for blind legal actors, brain-computer interfaces (BCIs) for legal actors with aphasia, and eye-movement-controlled systems for paralysed legal actors with aphasia foster their social and legal empowerment, and therefore their inclusion and participation in society and legal life.

Mental, emotional, and physical well-being. From the perspective of therapeutic jurisprudence,[142] the above multisensory digital media promote

140 See, for instance, Eberhard Grüning, 'Emotionale Kompetenz in Empowerment-Prozessen,' *Empowerment behinderter Menschen: Theorien, Konzepte, Best-Practice*, eds. Wolfram Kulig, Kerstin Schirbort, & Michael Schubert (Stuttgart: W. Kohlhammer, 2011), 189, 189-200.

141 See, for instance, Werner Schlummer, 'Empowerment—Grundlage für erfolgreiche Mitwirkung und Teilhabe', *Empowerment behinderter Menschen: Theorien, Konzepte, Best-Practice*, eds. Wolfram Kulig, Kerstin Schirbort, & Michael Schubert (Stuttgart: W. Kohlhammer, 2011), 31-46; Harald Goll, 'Menschenbild, Empowerment und Inklusion,' *Empowerment behinderter Menschen: Theorien, Konzepte, Best-Practice*, eds. Wolfram Kulig, Kerstin Schirbort, & Michael Schubert (Stuttgart: W. Kohlhammer, 2011), 109-118, and Otto Speck, 'Soziale Inklusion als pädagogische Idee und gesellschaftliche Herausforderung,' *Empowerment behinderter Menschen: Theorien, Konzepte, Best-Practice*, eds. Wolfram Kulig, Kerstin Schirbort & Michael Schubert (Stuttgart: W. Kohlhammer, 2011), 285-294.

142 On therapeutic jurisprudence, see, for instance, Bruce J. Winick, 'Therapeutic Jurisprudence: Enhancing the Relationship Between Law and Psychology', *Law and Psychology: Current Legal Legal Issues 2006*, Vol. 9, eds. Belinda Brooks-Gordon & Michael Freeman (Oxford: Oxford University Press, 2006), 32-36, 30-48. See also Brunschwig, 'Multisensory Law and Therapeutic Jurisprudence,' 715-717 (with further references).

the mental, emotional, and physical well-being of legal actors, whether they have special needs or not.

12.4.2. Weaknesses

Multisensory brain-computer interfaces have started being developed and, by implication, still require development.[143] Only exceptionally are paralysed legal actors with aphasia able to benefit from multisensory digital media and from brain-computer interfaces in particular.[144]

12.4.3. Opportunities

Since the development of multisensory digital media and especially brain-computer interfaces has only just begun, these media may quite possibly develop further not only in the present but also in the future. Thus, a BBC technology report on Mooly Eden, president of Intel Israel, notes that he 'calls his latest venture *perceptual* [my emphasis] computing—and it involves controlling computers with gestures—with your voice, even with your eyes.'[145]

Such 'perceptual computing',[146] 'cognitive computing',[147] or indeed *multisensory* computing will ultimately also change interpersonal communication. By implication, multisensory digital media might prove even more useful to legal actors, whether they have special needs or not.[148] The constant progression of multisensory digital media might even allow legal actors to benefit even more significantly from ongoing developments. Time will tell just how and in which directions.

143 See Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 576.

144 See id., 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 578.

145 BBC News Technology, Tech, 'CES 2013: Intel's drive for "perceptual computing",' 9 January 2013, available at: http://www.bbc.co.uk/news/technology-20966923 (last accessed on 4 February 2013).

146 Ibid.

147 Meyerson, 'The IBM Next 5 in 5,' [s.p.].

148 See Newesely, 'Über das Verbale hinausgehende rechtliche Willensbekundungen durch Personen mit Sprachstörungen,' 576; Newesely expresses his hopes especially regarding the needs of aphasic persons.

12.4.4. Threats

As far as I can see, threats lie largely in the cultural environment and consequently also in the legal context:

Threats in the cultural environment. To understand the threats in the cultural environment, it is necessary to consider the senses not only 'from a purely physical and personal psychological perspective'.[149] We must also become aware of 'how sensory experience may be collectively patterned by cultural ideology and practice'.[150] Thus, we can perceive a 'hegemony of vision in Western culture'.[151] Discussing this *hypervisualism*,[152] CLASSEN observes that 'modern Western culture is a culture of the eye. We are constantly bombarded, seduced, and shaped by visual models and representations, from maps and graphs to pictures and texts'.[153] This hypervisualism has serious implications, since the 'rule of sight carries with it a powerful aura of rationality and objectivity, even though many of its contemporary manifestations, such as advertising images, seem designed to manipulate the emotions more than to encourage the exercise of reason.'[154]

Overemphasising sight or vision also affects scholarly discourses and helps explain their strong verbo- and ocularocentric tendencies. HOWES, a Canadian anthropologist of the senses, warns that 'Just as scientists usually fail to consider cultural factors in their study of perception, they usually fail to recognize that science itself is a product of culture.'[155] The impact is far-reaching, so HOWES, because 'scientific paradigms, in fact, are themselves heavily influenced by perceptual paradigms … Today we are so accustomed to scientific visualism that we scarcely ever feel the desire for any other perceptual paradigms of the world.'[156] In sum, the cur-

149 David Howes, *Sensual Relations: Engaging the Senses in Culture & Social Theory* (Ann Arbor, MI: The University of Michigan Press: 2010), XI.

150 Howes, *Sensual Relations*, XI.

151 Id., *Sensual Relations*, XII.

152 Id. *Sensual Relations*, XIII.

153 Constance Classen, *The Color of Angels: Cosmology, gender and the aesthetic imagination* (London, New York, NY: Routledge, 1998), 1.

154 Ibid.

155 David Howes, 'Introduction: Empires of the Senses,' *Empire of the Senses: The Sensual Culture Reader*, ed. David Howes (Oxford, New York, NY: Berg, 2006), 5.

156 Ibid.

rent ocularocentrism in Western culture may be seen to threaten any other uni- or rather multisensory paradigm.

Threats in the legal context. BENTLY tentatively suggests that law is ocularocentric.[157] As shown (1.1.2), some legal scholars argue that a 'visual turn' is occurring in the legal context.[158] These voices carry substantial weight, since they stem from law professors whose publications enjoy broad reception. In other words, their insights are widely quoted or paraphrased in relevant publications. From the perspective of the sociology of science, such acclaim is not irrelevant: members of the scientific community tend to follow the views of widely recognised (and often-cited) scholars.[159]

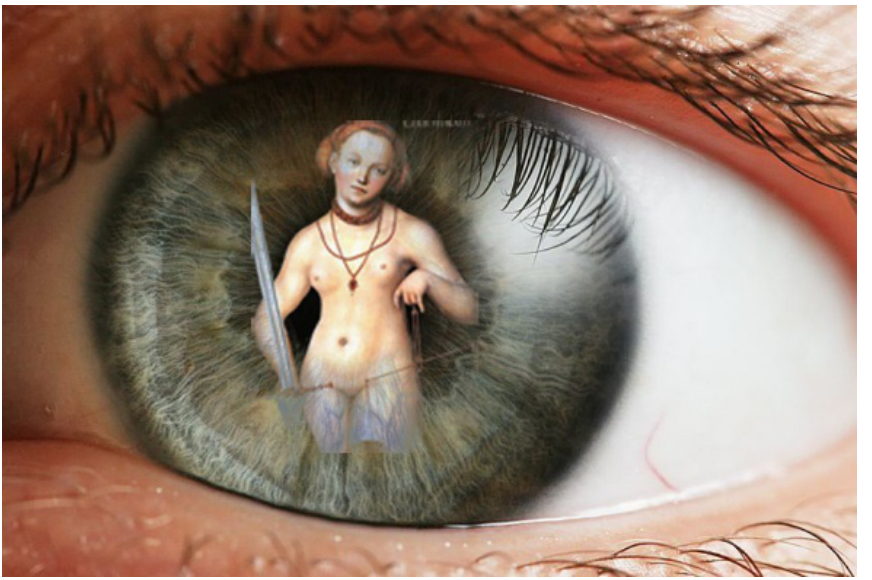

Figure 12.4: Ocularocentric justice.

The illustration consists of two images. I have embedded Lucas Cranach The Elder's Justice as a Naked Woman with Sword and Scales (1537) (http://en.wikipedia.org/wiki/File:Gerechtigkeit-1537.jpg) in the image of

157 Bently, 'Introduction,' 5-6.

158 Sherwin, *Visualizing Law in the Age of the Digital Baroque*, 11. See also Feigenson & Spiesel, *Law on Display*, 13-17.

159 See Peter Weingart, *Wissenschaftssoziologie* (Bielefeld: transcript Verlag, 2003), 32-33.

the eye (see http://commons.wikimedia.org/wiki/File:Eye_ iris.jpg). Both pictures are in the public domain.

Those questioning such an ocularocentric view therefore risk being ignored, marginalised, or excessively criticised. Thus, scholars favouring a multisensory perspective on law and questioning verbo- and ocularocentric perspectives may experience such a fate. Even if they manage to illustrate a doubtless existing trend toward multisensory legal communication practices, this might be to no great avail. Scholarly dogmas and scientific paradigms are harder to break than bank vaults. Besides, the struggle for material resources in scholarship has recently further intensfied and become overtly fierce.[160] Seen somewhat pessimistically, the established legal disciplines might well be little inclined to share their coffers with multisensory law.

12.5. Further questions and answers

Above (1.3), I have raised several further questions: How could or rather should greater awareness be raised in legal discourse about the current and future relevance of multisensory digital media for the law? How could or rather should the marginalising and disregarding of multisensory digital legal communication practices be challenged? How are the research questions raised in this paper relevant to legal discourse, particularly to legal history, legal informatics, legal pedagogy, legal psychology, and legal theory?

Doing proper justice to these questions will require a lot more extensive research. For now, I limit myself to outlining brief and tentative answers. I shall leave open the last question (how are the research questions raised in this paper relevant to legal discourse?) and shall instead raise further, generally formulated questions. Such a procedure seems legitimate, because the last question extends to a wide range of further legal relevant topics whose depths cannot be foreseen.

160 Martin Reinhart, 'Wissenschaft und Wirtschaft: Von Entdeckung zu Innovation,' *Handbuch Wissenschaftssoziologie*, eds. Sabine Maasen et al. (Wiesbaden: Springer VS, 2012), 373-374, 365-378.

12.5.1. How to raise greater awareness about the relevance of multisensory digital media for the law?

Greater awareness in legal discourse about the current and future relevance of multisensory digital media for the law could or rather should be raised in various ways. Two such ways are presentations and discussions at national and international conferences, especially on legal history, legal informatics, legal pedagogy, legal psychology, legal theory, and multisensory law. Moreover, print and online publications will also contribute to raising greater awareness of this cardinal issue among scholars. Newspaper articles addressed to an interested lay audience will also serve this goal. Basic and further legal education should be open to all these debates and integrate them into law's curricula.

12.5.2. How to challenge the marginalising and ignoring of multisensory digital media?

As might have already become clear, this paper has tried to challenge the marginalising and ignoring of multisensory legal communication practices. The strongest 'mental weapon' to question or even defy legal verbo- and ocularocentrism is to draw the attention of the scientific community to insights from the anthropology of the senses. In response to many scholarly turns, including the visual turn, HOWES explains that 'The rise of sensory studies at the turn of the twenty-first century draws on each of these prior developments or "turns" but also critiques them by questioning the verbocentrism of the linguistic model, the ocularcentrism of the visual culture model, and the holism of both the corporeal and material culture models —in which bodies and objects are often treated simply as physical wholes and not as bundles of interconnected experiences and properties.'

The virtue of sensory studies approaches is that they 'emphasize the dynamic, relational (intersensory—or multimodal, multimedia) and often conflicted nature of our everyday engagement with the sensuous world.'[161] Law, I suggest, needs to embrace such thinking if it is to keep pace with human, social, and technological developments.

161 David Howes, 'Charting the Sensorial Revolution,' *Senses & Society*, Vol. 1, Issue 1 (2006), 115, 113-128.

12.5.3. How are the research questions in this paper relevant to legal discourse?

How are the research questions raised in this paper relevant to legal discourse, particularly to legal history, legal informatics, legal pedagogy, legal psychology, and legal theory? As explained in the introduction to this section, I shall 'answer' this question by raising further, generally formulated questions.

What are the historical dimensions of multisensory law? How could these dimensions be explored? Which fundamental questions concerning law's unisensory and multisensory dimensions in legal history should be raised? Which subject matters should be treated?

How are legal informatics and multisensory law related? How could these legal disciplines cross-fertilise one another? Particularly, which additional questions should multisensory law raise and which insights from other disciplines *intra* or *extra muros* should multisensory law adopt to stimulate the discourse of legal informatics?

How can the relationship between multisensory law and legal pedagogy (legal education) be characterised? How should multisensory law and its various branches (i.e., visual law, audio-visual law, tactile-kinaesthetic law, and so forth) play a significant part in transforming legal education? Which fundamental questions should multisensory law address to sustainably support this process of transformation?

How are multisensory law and (legal) psychology related? What is the psychological impact of multisensory media on the law, be these media digital or not? In terms of therapeutic jurisprudence, do they have positive (i.e. 'therapeutic') or negative (i.e. 'anti-therapeutic') consequences? If so, in which sense?

How should the theory of multisensory law be designed? That is, how could the 'sensorial poverty of contemporary [legal; my insertion] theory'[162] be remedied? If such a theoretical venture were undertaken, what

162 Howes, 'Introduction: Empires of the Senses,' 1. Howe's observation refers to theory in general. Given its poignancy, I take the liberty of transferring it to the legal context.

would a 'sensational jurisprudence'[163] or rather a multisensory jurisprudence, that is, a multisensory legal theory look like?

12.6. Findings, conclusions, and outlook

12.6.1. Findings

This paper has shown that multisensory digital media impact the law. Already now a trend exists toward the law as a multisensory phenomenon, that is, toward multisensory digital legal communication practices. This trend might grow in future. As described below, multisensory digital media have and might have a further bearing on the law in terms of strengths, weaknesses, opportunities, and threats.

12.6.1.1. Strengths and weaknesses

Multisensory digital media contribute to better truth seeking and finding. These media also promote social and legal empowerment, and therefore the inclusion and participation of legal actors with special needs. These media help promote the mental, emotional, and physical well-being of legal actors, whether they have special needs or not.

Certain multisensory digital media, such as brain-computer interfaces require further development. Along these lines, they still appear quite weak. A further weakness is that these media are neither readily not widely available to legal actors with special needs.

12.6.1.2. Opportunities and threats

It is, however, highly possible that multisensory digital media will develop further in the future. Thus, legal actors with or without special needs will have the opportunity of benefitting from such media to an even greater extent. This paper has also shown that greater awareness of the current and future relevance of multisensory digital media can be raised variously in the legal discourse. As shown, the anthropology of the senses fundamentally questions the verbo- and ocularocentrism of Western (legal) culture. Drawing attention to these insights, this paper challenges the marginalising

163 Lionel Bently & Leo Flynn (eds.), *Law and the Senses: Sensational Jurisprudence* (London, Chicago, IL: Pluto Press 1996).

and ignoring of multisensory legal communication practices. I am confident that the questions and answers suggested here are relevant and offer other legal disciplines the opportunity for cognitive and emotional growth (such disciplines include legal history, legal informatics, legal pedagogy, legal psychology, and legal theory).

Brain-computer interfaces might also pose a threat to legal discourse because they potentially allow for obtaining private information from our brains.[164] AUSTIN warns that '[l]aw schools ought to be in the vanguard of the movement to take advantage of digital technologies' power to argue and persuade. If law schools fail to seize the initiative, the entire profession will lag behind.'[165] Such a failure would pose a further threat. The current verbo- and ocularocentrism of Western culture in general and in legal culture in particular essentially threatens the new multisensory legal paradigm. As far as I can see, this is one of the greatest threats. From the perspective of the sociology of science, the established disciplines of the applicable law and/or the basic legal disciplines may resist (acknowledging) the emergence of multisensory law. The current struggle for material resources in the academic context has become a grim battle. In institutional terms, multisensory law's position is still weak. It is therefore under threat and perhaps not equipped to wage—let alone win—such an existential fight.

12.6.2. Conclusions

I warmly recommend not only legal research and teaching, but also legal practice and legislation to adopt this paper's insights. What does or would this mean?

12.6.2.1. Turn to all sensory legal communication practices

Legal research, teaching, and practice should doubtless explore the law as a unisensory (i.e., visual, auditory, tactile, and so forth) phenomenon. Today, particularly visual legal communication practices need to be

164 Ivan Martinovic et al., 'On the Feasibility of Side-Channel Attacks with Brain-Computer Interfaces,' 21st USENIX Security Symposion, August 8-10, 2012, available at https://www.usenix.org/conference/usenixsecurity12/feasibility-side-channel-attacks-brain-computer-interfaces (last accessed on 4 February 2013).

165 Regina Austin, 'The Next "New Wave": Law-Genre Documentaries, Lawyering in Support of the Creative Process, and Visual Legal Advocacy,' *Fordham Intell. Prop. Media & Ent. L.J.*, Vol. 16 (2006), 868, 809-868.

explored, whether they are digital or not. Such exploration would involve studying legal norm images, legal visualisations in court judgments, legal visualisations in legal research and education, legal visualisations in private legal practice (e.g., legal visualisations in contracts), legal visualisations in e-government and e-justice, visual evidence in civil and criminal procedure, visual legal culture, and so forth.

In addition, legal research, teaching, and practice should turn to the law as a multisensory (i.e., audio-visual, tactile-kinaesthetic, visual-kinaesthetic, and so forth) phenomenon, that is, to multisensory legal communication practices, be they digital or not. In so doing, jurisprudence and legal practice would need to draw from various legal and non-legal disciplines.[166]

12.6.2.2. Transformation of literacies

The term *literacy* originally only referred to the ability of human beings to read and write.[167] Given the advent of the new uni- and multisensory digital media, *verbal* literacy and particularly verbal legal literacy need to be transformed.

Transformation of verbal literacy. Existing literacies need to be transformed, especially in educational settings. Already in 2003, HOCKS argued that 'when we bring an understanding of digital rhetoric to our classrooms, we need to expand our approach not only to rhetorical criticism but also to text production.'[168] Crucially, 'digital technologies can encourage what the New London School theorists call a *multimodal* approach to literacy, where using communication technologies engages students in a *multisensory* experience and active construction of knowledge. To use multimedia technologies effectively, writers have to use practices that are not just verbal but visual, spatial, aural, and gestural to make meaning … [my emphases].'[169]

Reflecting on the seminal achievements of the New London School theorists, HOCKS asserts that they 'make a powerful case for redefining liter-

166 See, for instance, Sherwin, 'A Manifesto for Visual Legal Reelism,' 720, and Feigenson & Spiesel, *Law on Display*, xii-xiii.

167 See Paul Messaris, *Visual 'Literacy': Image, Mind, and Reality* (Boulder, CO, San Francisco, CA, and Oxford: Westview Press, 1994), 2.

168 Mary E. Hocks, 'Understanding Visual Rhetoric in Digital Writing Environments,' *College Composition and Communication*, Vol. 54, No. 4 (2003), 644, 629-656.

169 Ibid.

acy practice and attending to the political and social impact made possible by technologies as complex artifacts that can help transform our lived experience.'[170] And, importantly as regards teaching and its transformation, 'Their approach to pedagogy suggests that students can work from within their diverse cultures and multiple identities using their own languages as well their everyday lived experiences to design and new kinds of knowledge.'[171]

I agree with HOCKS, with the exception of her verbocentric or language-centred terminology. She refers to 'text production' perhaps because she is a professor of English, that is, a language-oriented scholar. As HOCKS suggests, today such production also involves producing images, be they still or dynamic, accompanied by sounds and written and/or spoken words. Neither can one write pictures nor 'write with pictures',[172] as FEIGENSON & SPIESEL claim.[173] Such a verbo- or logocentric perspective underestimates the iconic properties (iconicity) of pictures. Iconicity should not be reduced to verbalism—not even metaphorically. Thus, HOCKS concedes that '… the process of design is fundamentally visual and multimodal, it can be challenging, but it leads students to a new understanding of how designed spaces and artifacts impact audiences.'[174]

Transformation of verbal legal literacy. Contemplating our digital age, SHERWIN postulates that 'much of the content and many tools of legal meaning making have changed from what they once were.'[175] This, he argues, means that 'the education of lawyers, judges, and citizens must follow suit.'[176] I would support SHERWIN's claim that we should 'respect the medium'.[177] What does this mean? Shifting from one medium to another, SHERWIN suggests, means that 'we not only encounter new content, we also become accustomed to new ways of experiencing and thinking about that content.'[178] In our present context, this means that we

170 Ibid.
171 Hocks, 'Understanding Visual Rhetoric in Digital Writing Environments,' 644.
172 Feigenson & Spiesel, *Law on Display*, 131.
173 See also id., *Law on Display,* 23, 83.
174 Hocks, 'Understanding Visual Rhetoric in Digital Writing Environments,' 652.
175 Sherwin, 'A Manifesto for Visual Legal Reelism,' 743,
176 Ibid.
177 Id., 'A Manifesto for Visual Legal Reelism,' 736.
178 Ibid.

should respect multisensory digital media and their implications for the law, specifically their effects on legal and legally relevant thinking, learning, content production, reception, and assessment.

The transformation of verbal legal literacy should start with integrating visual legal literacy. There are many definitions of visual literacy.[179] Generally, it involves 'visual thinking, visual learning, and visual communication.'[180] Hence, legal visual literacy should include visual legal thinking, visual legal learning, and visual legal communication. In its communicative aspect, visual literacy also concerns 'the ability to intelligently decode messages embedded in visual forms'[181] and the 'ability to actively generate new visual forms for communication.'[182] Consequently, visual legal literacy should encompass the capacity to create, analyse, and assess visual legal communication.

As regards legal education, SPIESEL, SHERWIN, & FEIGENSON ask 'just what is it that law students need to know when it comes to images?'[183] In response, they suggest that 'law students need to learn what images are, how they are perceived and interpreted, and how they propagate through the culture like sporulating fungi.'[184] Such literacy is crucial, they further argue, since 'legal professionals rarely understand the images they use because visual literacy has not been part of their education; has not been regarded as an essential skills set.'[185]

SUH's reflections on the usefulness of visual literacy should be transferred to the legal context: 'It can be argued that visual literacy is useful primarily for purposes of self-defense, as a knowledge base for resisting and

179 On visual literacy, see, for instance, Messaris, *Visual Literacy,'* 1-40.

180 Taewon Suh, 'Visual Persuasion,' *Communication Research Trends*, Vol. 19, No. 3 (1999), 13, 4-18.

181 Suh, 'Visual Persuasion,' 14.

182 Ibid.

183 Christina O. Spiesel, Richard K. Sherwin, & Neal Feigenson, 'Law in the Age of Images: The Challenge of Visual Literacy,' *Contemporary Issues of the Semiotics of Law: Cultural and Symbolic Analyses of Law in a Global Context*, eds. Anne Wagner, Tracey Summerfield, & Farid Benavides Vanegas (Oxford: Hart Pub, 2005), 246, 231-255.

184 Id., 'Law in the Age of Images,' 246.

185 Ibid. On visual legal literacy, see also Feigenson & Spiesel, *Law on Display*, 17, 195, 214, and 217, and Sherwin, *Visualizing Law in the Age of the Digital Baroque*, 3, 5, 11, 23, 33, 147, and 187.

counteracting the baneful influence of mendacious ads, sensationalistic movies, and the like.' Countering this somewhat pessimistic perspective, he argues that 'by acquiring visual literacy people enrich their repertoires of cognitive skills and gain access to powerful new tools of creative thought'.[186]

Along these lines, WALTER, in a recent paper on neuroimaging, claims that future judges should learn 'the fundamental difference between functional and structural images.'[187] One could think about how visual legal literacy could otherwise be useful.

Thus, transforming verbal legal literacy toward visual legal literacy should extend to what I would call audio-visual legal literacy and multisensory legal literacy. In the end, multisensory legal literacy would involve all sensory legal literacies.

12.6.2.3. Handling multisensory digital media

On the one hand, we need to welcome multisensory digital media in the legal context with open hearts and minds. On the other hand, we need to ensure that we do not aggrandise or exaggerate their present or actual capabilities.[188] Further, we need to be careful about assuming—prematurely—that we fully understand these media.[189] What is needed, on balance, is a critical approach to multisensory digital media.

12.6.2.4. Acting in conformity with the law

The application of multisensory digital media requires close attention to ensuring conformity with the law.[190] Thus, if deemed appropriate or in fact necessary, multisensory digital media could also aid the search for new court decisions and legislative activities which, however, should be well-adapted to the prevailing circumstances.

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186 Suh, 'Visual Persuasion,' 14.

187 Walter, 'Was können wir messen?' 80 (my translation).

188 See id., 'Was können wir messen?' 78.

189 Ibid.

190 Tade Matthias Spranger, 'Rechtliche Implikationen der Generierung und Verwendung neurowissenschaftlicher Erkenntnisse,' *Von der Neuroethik zum Neurorecht?* eds. Stephan Schleim, Tade Matthias Spranger, & Henrik Walter (Göttingen: Vandenhoeck & Ruprecht, 2009), 211, 193-213.

12.6.3. Outlook

12.6.3.1. There is more to come

12.6.3.1.1. General remarks

Based on our recent experiences with digital media, we know that there is more to come. The 'digital revolution' is ongoing[191] and involves the further rapid development of digital media. These developments 'are not just local but global.'[192] Along with HENDERSON & EPSTEIN, I would anticipate 'more developments for the future in the future'.[193]

MEYERSON predicts that 'computers will mimic the senses'. As regards touch and movement, '[y]ou will be able to reach out and touch through your phone'. As regards sight, '[a] pixel will be worth a thousand words'. As regards hearing, '[c]omputers will hear what matters'. As regards taste, '[d]igital taste buds will help you to eat healthier'. And, finally, as regards smell, '[c]omputers will have a sense of smell'.[194] From a scholarly perspective, MEYERSON's predictions require closer scrutiny and more sophisticated rephrasing. None the less, they help anticipate highly likely paths of development.

Poignantly, SHERWIN wonders 'how long law schools will persist in the pretense that law remains exclusively a matter of words, regardless of whether we speak of "law in the books" or "law in action", only time will tell.'[195] In response, he sounds a warning note worth observing: 'But the longer this ostrich-like behaviour continues within the hall of legal academia, the further legal training will retreat from the practical realities of legal practice.'[196]

191 Wahlgren, 'Visualization of the Law,' 20.

192 Carol Henderson & Jules Epstein, 'Preface,' *The Future of Evidence: How Science & Technology Will Change the Practice of Law, eds. Carol Henderson & Jules Epstein* (Chicago, IL: American Bar Association, 2011), ix.

193 Id., 'Preface,' xi.

194 Meyerson, 'The IBM Next 5 in 5,' [s.p.].

195 Sherwin, 'A Manifesto for Visual Legal Realism,' 725.

196 Sherwin, 'A Manifesto for Visual Legal Realism,' 725.

12.6.3.1.2. Examples

Here are a few examples of what more is to come, presented in the order discovered:

Virtual realities. Already in 1992, STEUER observed: 'Given the great attention such technologies have achieved in recent years, it seems safe to assume that substantial advances will be made in this direction in the near future.'[197] As seen, virtual realities are involving increasingly more senses. On the promise that such realities hold out, STEUER asserts that such 'New technologies promise to expand both the sensory breadth and depth of mediated experience … The ramifications of media systems whose representations are perceptually indistinguishable from their real-world counterparts are both exciting and terrifying—exciting because of the possibilities afforded by such systems to experience distant and nonexistent worlds, and terrifying because of the blurring of distinction between representation and reality.'[198] As discussed (3.1.2), these multisensory virtual realities serve or might serve as multisensory evidence.

Leap motion. The *Leap Motion Controller* enables humans to interact with a computer 'in three dimensions using just … hand and finger movements and Leap Motion enabled software.'[199] Leap Motion allows users to design visual content through hand and finger movements. Making these movements, users are able to scroll, zoom, and rotate objects, without having to touch the screen. Moreover, one or several fingers can be used as a mouse.[200] I could imagine law professors using this visual-kinaesthetic digital medium for teaching purposes, for instance, for drawing rather than reading legal concepts for their students' benefit. Practising lawyers might use this medium to present evidence in court.

Electronic nose. An electronic nose 'is an electronic instrument that is capable of detecting and recognizing many gazes and odors, and comprises a sensor array using several chemosensors and a computer.'[201] Moreover,

197 Steuer, 'Defining Virtual Reality,' 83.

198 Id., 'Defining Virtual Reality,' 84.

199 https://leapmotion.com/product; see also http://www.bbc.co.uk/news/technology-20987236 (both websites last accessed on 4 February 2013).

200 See https://leapmotion.com/ (last accessed on 4 February 2013).

201 H. Nanto & J. R. Stetter, 'Introduction to Chemosensors,' *Handbook of Machine Olfaction: Electronic Nose Technology*, eds. Tim C. Pearce et al. (Weinheim: Wiley-VCH, 2003), 79, 79-104.

'[a] chemosensor is a device that is capable of converting a chemical quantity into an electrical signal and respondate the concentration of specific particles such as atoms, molecules, or ions in gases or liquids by providing an electrical signal.'[202] MARKS points out the growing legal significance of electronic noses: 'Olfactory surveillance—the monitoring of personal odour—is on the increase. The number of dogs trained in the detection of criminal suspects and substances is growing. But dogs aren't the only tool envisioned for the future. … Companies across the globe are designing and touting 'electronic noses', machines that seek to mimic the mammalian sensory apparatus, in an attempt to satisfy new security demands.'[203] Placing electronic noses in a wider context, MARKS states that 'once referred to as the 'neglected sense', the science of olfaction is experiencing a resurgence of interest and researchers predict that, in the near future, our knowledge of it will rival that of visual sciences.'[204] Citing biologist Lyall Watson, who considers the crucial role of the olfactory system, MARKS adds that 'there is a general and universal system of chemical communication in which all living things are involved.'[205] This system, she continues, produces '"a coordinated ecological mechanism for the regulation of who goes where, and how many can afford to do so." The security services want to tap into this primordial information, then exchange and use it in border controls and the wars on crime, terrorism and antisocial behaviour. Watson predicts that a heightened olfactory consciousness will enable us to "get to know who the good guys are." The security services seem to think the science of olfaction is already sufficiently advanced to enable them to do this.'[206]

China, for instance, 'has established a "scent bank" of odours sampled from criminal suspects and crime scenes. According to a document leaked to *The Observer*, GCHQ, the British intelligence agency, has been evaluating the merits of odour as a means of personal identification.'[207] As MARKS further notes, delicate legal questions are involved:

'The supreme court of South Australia dismissed the argument that a dog "sniff" is an invasion of privacy on the basis that odours emitted from a person are routinely exposed to the perception of the public at large. But this reasoning ignores the fact that odour detection "tools"—such as

202 Ibid.

203 Amber Marks, 'Smells suspicious,' *The Guardian*, 31 March 2008, available at: http://www.guardian.co.uk/science/2008/mar/31/internationalcrime (last accessed on 4 February 2013).

204 Ibid.

205 Ibid.

206 Ibid.

207 Marks, 'Smells suspicious,' [s.p.].

trained dogs and electronic noses—enable the police to perceive information beyond the range of the human senses, placing them firmly within the category of "new surveillance" techniques first identified as a threat to legal regulators by Gary Marx, professor emeritus of sociology at the Massachusetts Institute of Technology. According to Marx, in extending the senses, new surveillance "challenges fundamental assumptions about personal and social borders that have been maintained not only by values and norms and social organisation but by the limits of technology to cross them". The threat is obvious: these new methods promise to render traditional investigatory techniques obsolete.'[208]

Given these new olfactory surveillance technologies, visual-olfactory surveillance might invade public space. For instance, if drugs are being consumed, olfactory surveillance will alert the video camera nearby. The video camera will film the drug consumers. If a person urinates or litters in public space, the same will happen. And so forth. Judges and legislators have always been confronted with new technologies and their legal impacts. Thus, they will have to come to terms with visual-olfactory surveillance, too, by regulating such technology and/or adapting jurisdiction (case law) to it.

Brain wave sensors. NeuroSky, a thriving manufacturer of brain-computer interfaces, offers brain wave sensors as consumer product applications.[209] Apparently, these brain wave sensors are able to determine whether we are focused or not. In connection with NeuroSky's headsets, FLEMING reports that 'several leading carmakers are exploring whether sensors built into the driver's headrest can tell if he or she is drowsy to drive safely, based on the pattern of electrical activity in the brain. Manufactures are testing a system that sounds an alarm when the sensors pick up patterns associated with sleepiness.'[210] Moreover, 'whereas current EEG headset sensors must touch the scalp or skin to pick up the brain's weak electrical signals, NeuroSky say its latest sensors can operate through fabric, such as the outer layer of a vehicle's headrest.'

208 Ibid. On the growing significance of electronic noses in the legal context, see also Brunschwig, 'Multisensory Law and Legal Informatics,' 649.

209 See http://www.neurosky.com/ (last accessed on 4 February 2013).

210 Nic Fleming, 'Automakers Test In-Car Brain Sensors: Manufacturers are testing a brain-wave-sensing system that sounds an alarm when it detects sleepiness,' *MIT Technology Review*, 18 August 2011, available at: http://www. Technologyreview. com/news/425060/automakers-test-in-car-brain-sensors/?p1=A3 (last accessed on 4 February 2013).

3D printing. This generates three-dimensional objects from a digital model.[211] Such three-dimensional objects can be seen, touched, and perhaps even smelled. Geomagic, for instance, 'is a global company dedicated to advancing and applying 3D technology'.[212] Just imagine a three-dimensional representation of the facts of a case.

12.6.3.2. Legal cyberorgs—or not?

Are we or will we become (legal) cyberorgs? Historian Robert JÜTTE remarks that 'the term "cyborg" was coined as long ago as 1960 by the American space scientist Manfred Clynes. It combines the words "cybernetic" and "organism" and means more than just a symbiotic relationship between humans and computers. A cyborg is a machine body controlled by artificial intelligence, and is therefore capable of existing without the assistance of human intelligence.'[213] As for possible future developments, 'it is questionable whether we shall ever reach the point where humans will be indistinguishable from computers.'[214] He then refers to the German writer Hans Magnus Enzenberger, who had 'words of encouragement for all who had nightmares at the thought of these biotechnological fantasies of the future: "The body's inertia will not let us down. Toothache is not virtual. We can't eat simulation. Our own death is not a media event. So, yes, we may rest assured that there is still life on this side of the digital world: the only life we have."'[215]

211 See BBC HARDtalk, 'Ping Fu: 3D printing is as big as the internet,' 28 January 2013, available at: http://news.bbc.co.uk/2/hi/programmes/hardtalk/9788066.stm, and Create it REAL, 3D Printing process, available at: http://www.createitreal.com/index.php/technology/process (both websites last accessed on 4 February 2013).

212 http://geomagic.com/en/about/geomagic/overview/ (last accessed on 4 February 2013).

213 Robert Jütte, *A History of the Senses: From Antiquity to Cyberspace*, transl. James Lynn (Cambridge, Malden, MA: Polity Press, 2005), 335.

214 Ibid.

215 Ibid.

12.6.3.3. Ad iurisprudentiam multisensualem

Legal actors will 'continue to grapple with the legal status of new technologies.'[216] I hope that multisensory law will open the eyes of the established disciplines of applicable law and/or the basic legal disciplines. It could do so by tackling questions inadequately explored (or not at all) and by drawing on insights disregarded by paradigmatic legal discourse. To a greater degree and to leave my own ocularocentric metaphor ('open the eyes') behind, multisensory law will contribute to opening up *all* the senses of the established legal disciplines.

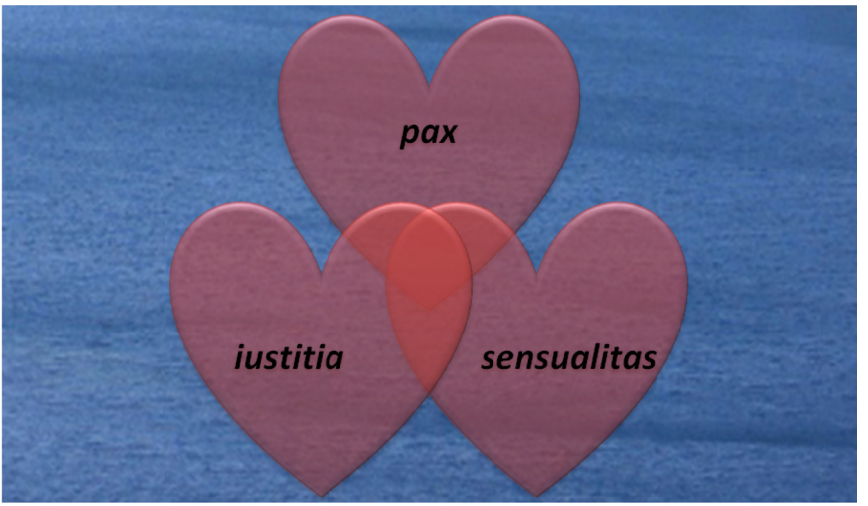

Figure 12.5: Iustitia (justice), pax (peace), and sensualitas (sense, sensuality).

In some paintings, *iustitia* (justice) embraces (and kisses) *pax* (peace).[217] Artists, legal (information) designers, and so forth might one day be inspired to create an allegory where *pax*, *iustitia*, and *sensualitas* (sense, sensuality) embrace (and kiss) each other. Most likely, *iurisprudentia verbosa et*

216 Jennifer L. Mnookin, 'The Image of Truth: Photographic Evidence and the Power of Analogy,' *Yale J.L. & Human*, Vol. 10, 73, 1-74. Mnookin's observation refers to photography. Given its poignancy, I take the liberty of referring it to evolving multisensory digital media.

217 http://de.wikipedia.org/w/index.php?title=Datei:Der_Ku%C3%9F_von_Gerechtigkeit_und_Friede.jpg&filetimestamp=20080206222604, and http://it.wikipedia.org/wiki/File:Justitia_et_pax_osculatae_sunt_-_BS_-_Pinacoteca_Tosio-Martinengo_-_foto_G._Dall%27Orto.jpg (last accessed on 4 February 2013).

picturata (verbose and pictorial jurisprudence)[218] will undergo transformation. She will rise from her somewhat obscure and therefore ultimately inferior position, and re-emerge as *iurisprudentia multisensualis* (multisensory jurisprudence). Defying verbocentrism and ocularocentrism in the legal context, I close with the following desideratum: *ad iurisprudentiam multisensualem*—toward multisensory jurisprudence or rather toward multisensory law.

218 Already in the 17th and 18th centuries, *iurisprudentia picturata* emerged as a legal discipline that explored the law as a visual phenomenon. On *iurisprudentia picturata*, see, for instance, Gernot Kocher, *Zeichen und Symbole des Rechts: Eine historische Ikonographie* (Munich: Verlag C. H. Beck, 1992), 8, and Heiner Lück, 'Rechtssymbolik,' *Reallexikon der Germanischen Altertumskunde*, *Vol. 24 Quadriburgium—Rind*, eds. Heinrich Beck, Dieter Geuenich, & Heiko Steuer, 2nd completely revised and extended ed. (Berlin, New York, NY: Walter de Gruyter, 2003), 284, 284-291.